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MECCANO MAGAZINE

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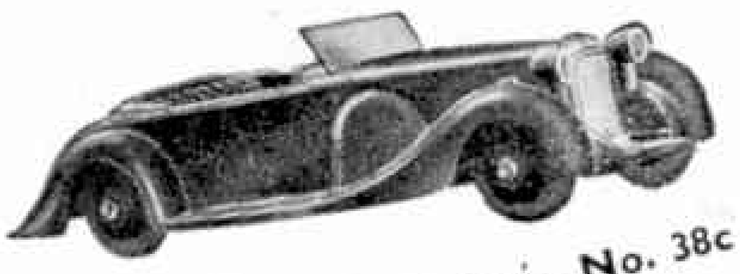

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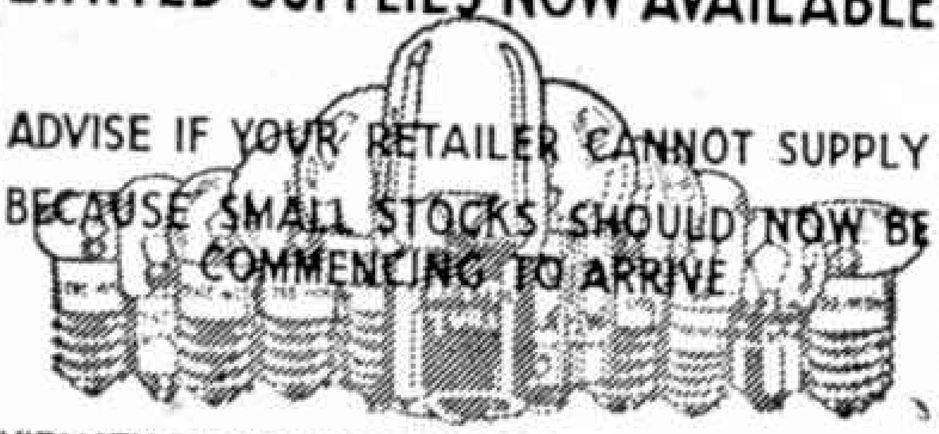

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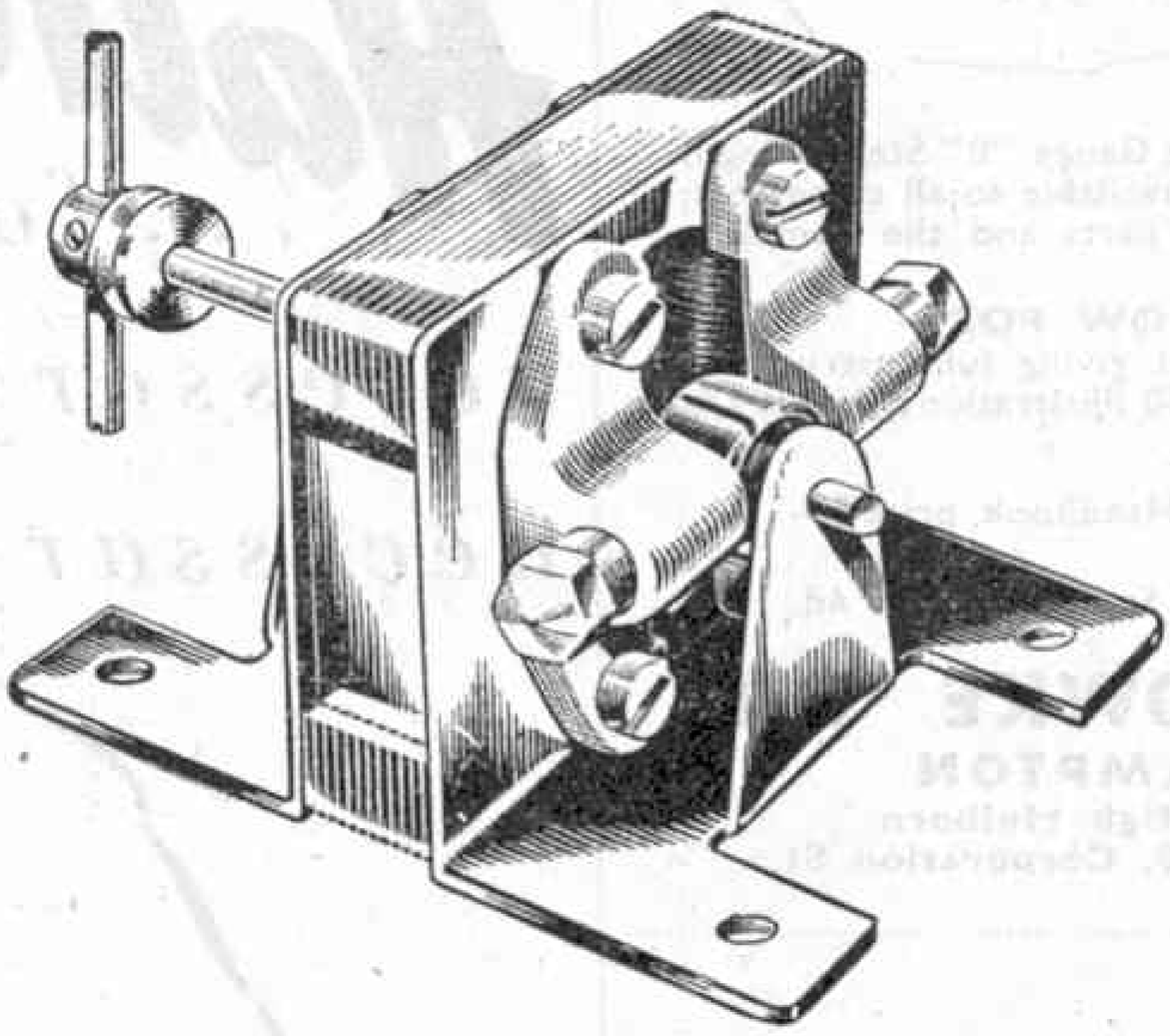

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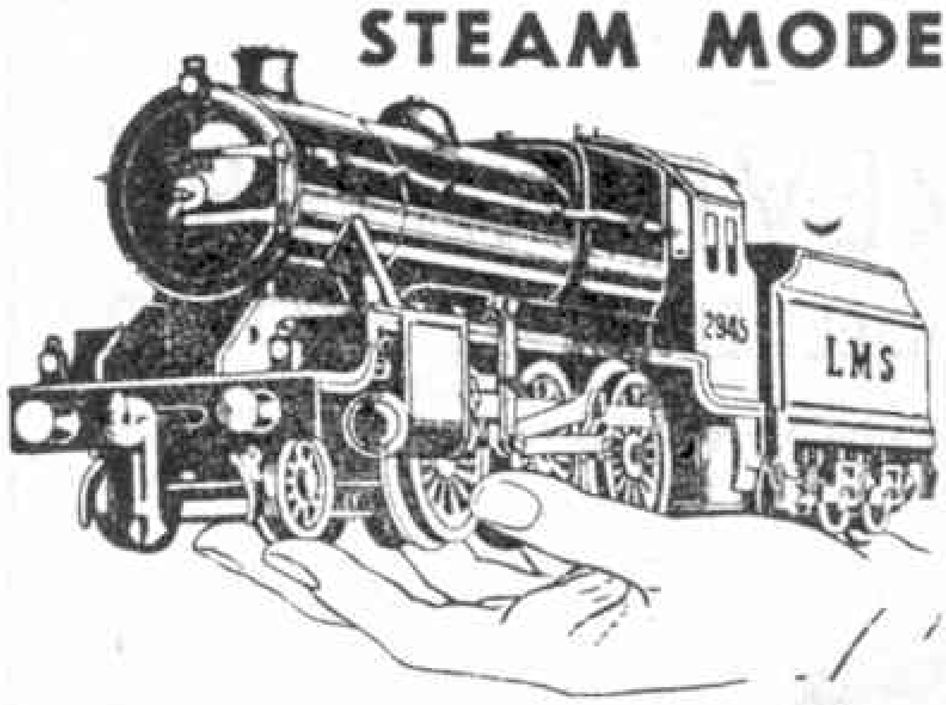

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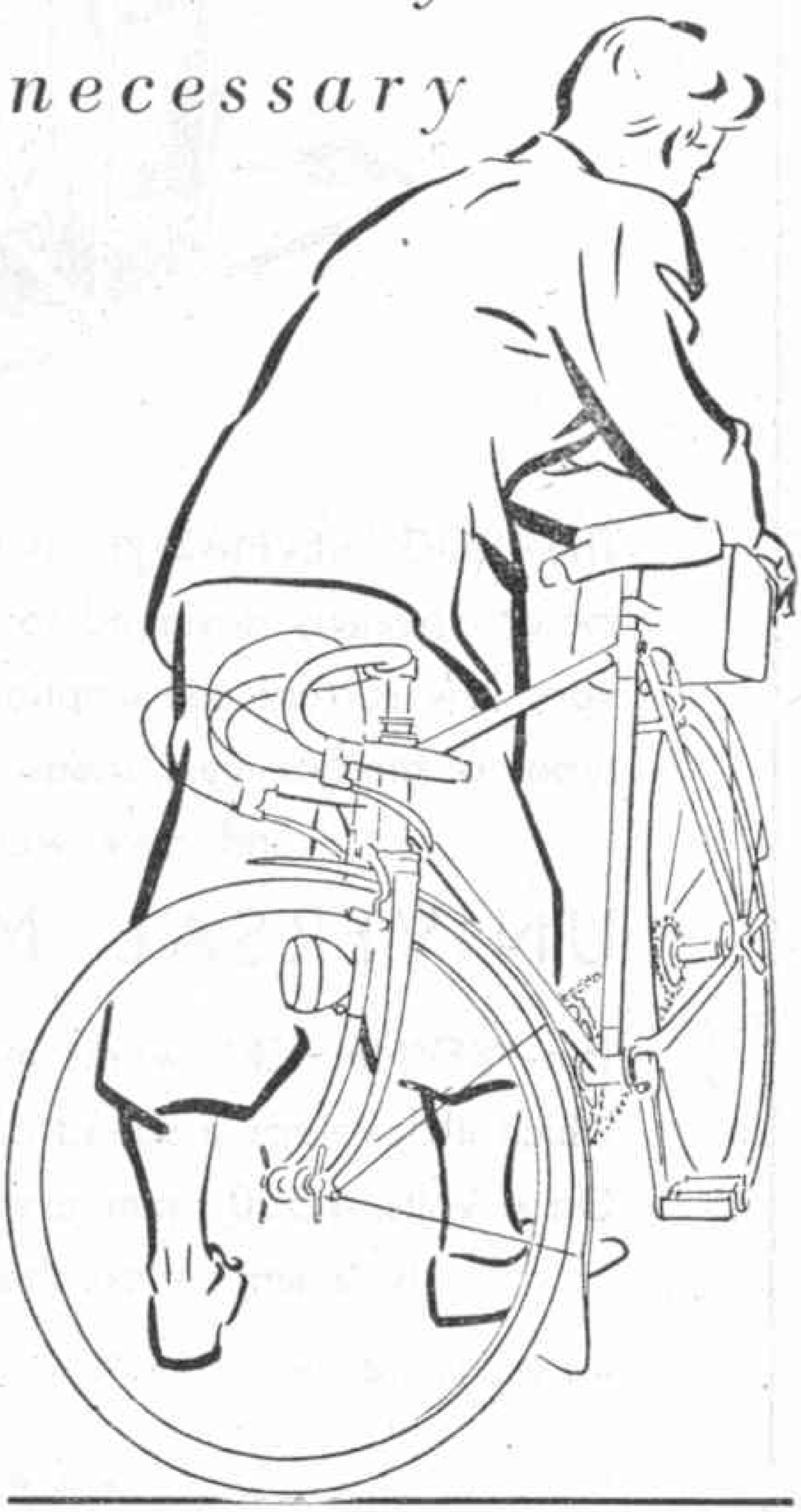

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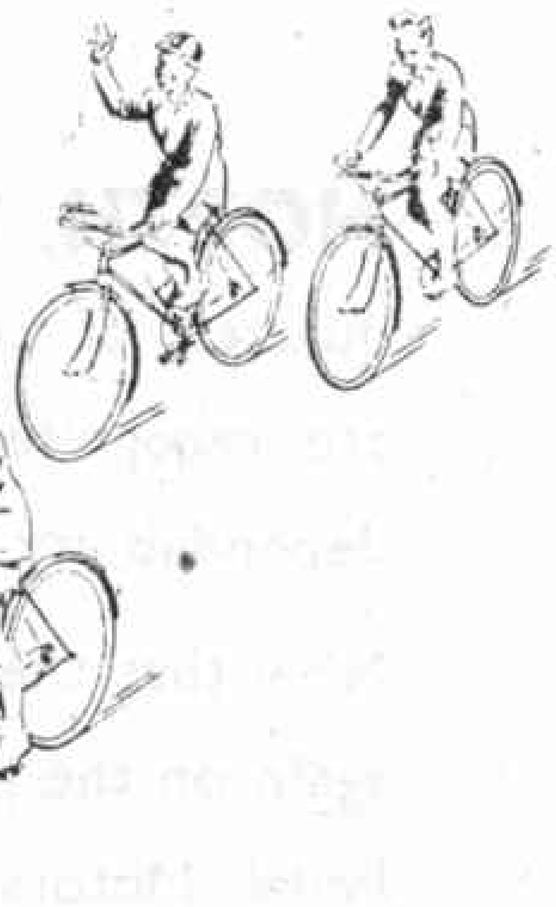

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Next Month: "YACHT RACING THRILLS." By A. Nettleton, F.R.G.S.

MECCANO MAGAZINE

Editorial Office:
Binns Road
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Vol. XXXI
No. 7
July 1946

With the Editor

The "Premier Line"

This month occurs the centenary of the former London and North Western Railway, now part of the L.M.S. The "North Western" was in many respects unique among railways. Its ancestry went back to the pioneer Liverpool and Manchester line, and to the London and Birmingham Railway, the first main line trunk route. It was the Royal Mail route to Scotland and Ireland as well as to many parts of England and Wales. It was specially favoured for Royal journeys and it maintained a complete and magnificent Royal Train that is still used.

The L.N.W. regarded itself as an aristocrat among railways. It did things in a grand manner and mostly did them well. Its claim to the title of the "Premier Line" was never actively disputed. It said of itself: "The London and North Western Railway is noted for punctuality, speed, smooth riding, dustless tracks, safety and comfort, and is the oldest established firm in the railway passenger business." Characteristically its coat-of-arms, which appeared on many of its locomotives and on its coaching stock, in addition to being worked into such details as compartment mats and waiting room carpets, included the national figure *"Britannia."*

It was in many ways a very independent company. It built and maintained its own locomotives at Crewe, its carriages at Wolverton, and its wagons at Earlestown; it made its own steel and rolled its own rails; it made and maintained its own signalling apparatus. It was the pioneer in the use of water troughs; it ran the first British dining car trains with corridors throughout, and it claimed the best permanent way in the world. There were many regrets when the L.N.W. lost its identity in the L.M.S. when grouping occurred in 1923.

Last month another interesting centenary occurred, that of the Edinburgh and Berwick line, the first to be built by the North British Railway. This railway, which was the first to cross the Border from Scotland into England, was the Scottish link that joined two years later with the York, Newcastle and Berwick Railway to complete the through East Coast route between Edinburgh and London. It became the largest Scottish railway system, connecting Edinburgh and Glasgow, and penetrating to Aberdeen on the East Coast and Mallaig on the west; while southward, like a true Scot, it penetrated into the Border country. Silloth, Carlisle and Hexham marked the limits of its "invasion" of England.

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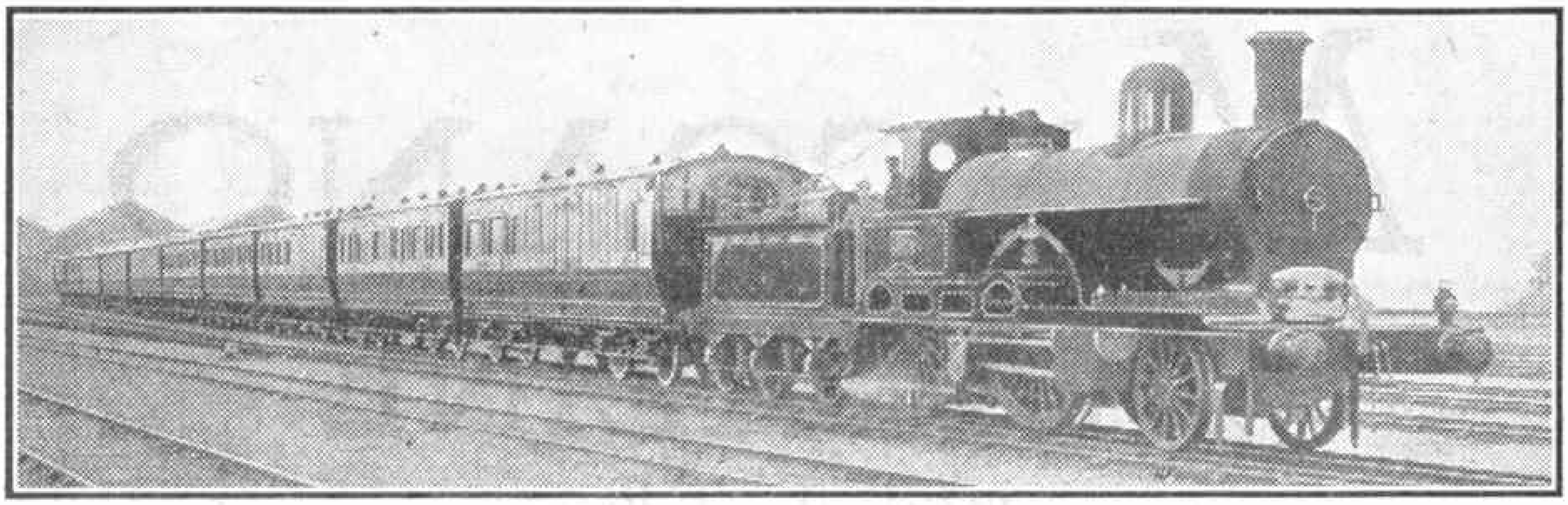


The once familiar L.N.W.R. "2 p.m." from Euston headed by the Webb compound locomotive "Jeanie Deans."
The photographs on this and the opposite page are by courtesy of the L.M.S.

The Centenary of the L.N.W.R.

Developments of a Century

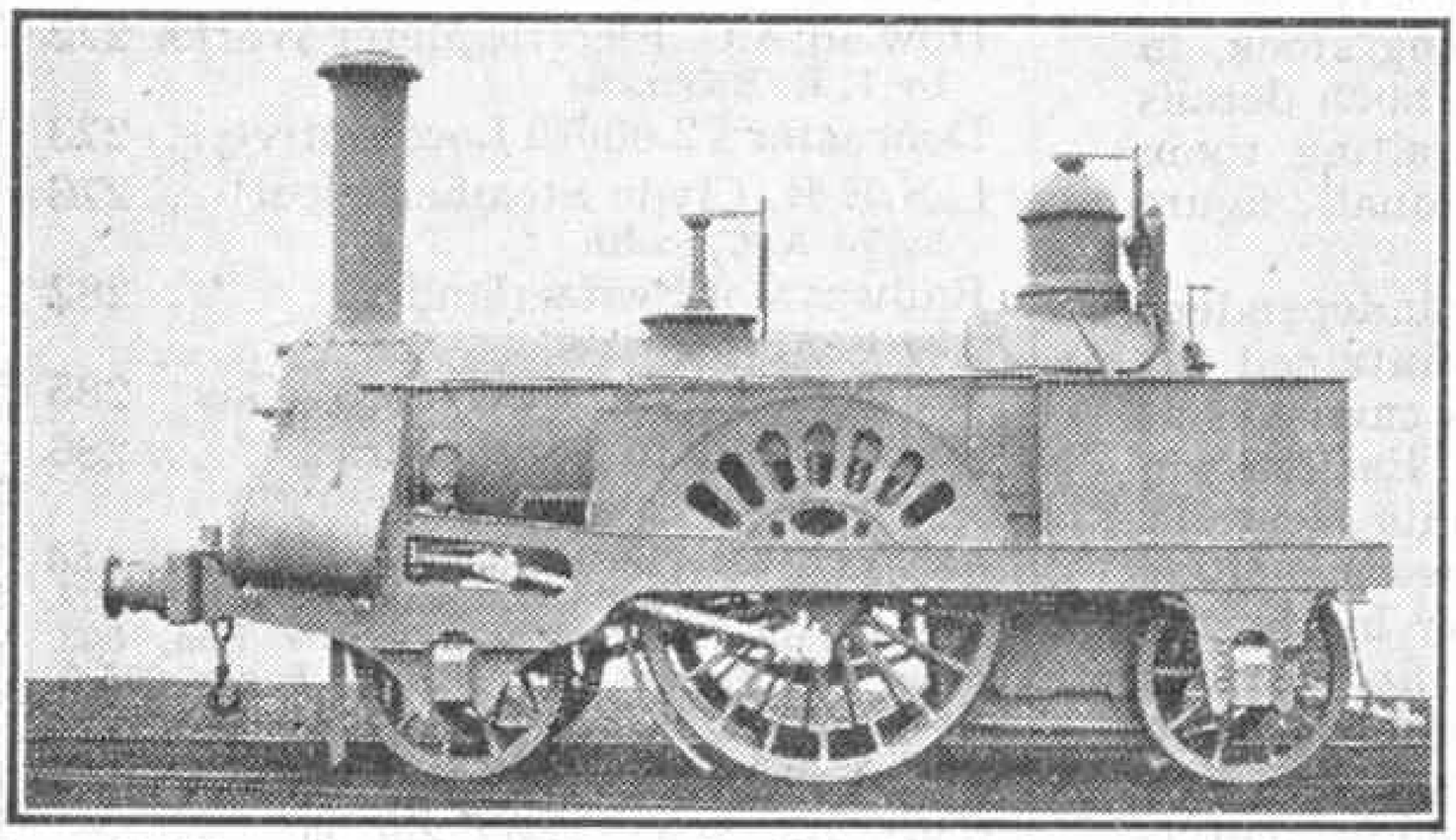
ON the 16th of this month occurs an important railway centenary, for on that day 100 years ago was formed the London and North Western Railway—the one-time "Premier Line" and aristocrat of British railways with a character all its own, and one of the principal constituent companies of the L.M.S. in which it lost its identity on 1st January 1923.

The L.N.W.R. was formed by the amalgamation of the London and Birmingham, the Grand Junction and the Manchester and Birmingham Railways. The Grand Junction, primarily a line from Birmingham to Warrington, included a number of smaller concerns, among them the pioneer Liverpool and Manchester railway which it had absorbed in 1845. The Grand Junction itself had first been opened in 1837, but the Liverpool and Manchester had been in operation since 1830. The London and Birmingham, the first main line trunk route, was opened throughout in 1838. The first section had been brought into use as early as 1834, but the opening from end to end was delayed by difficulties encountered in the boring of Kilsby Tunnel south of Rugby. The Manchester and Birmingham Railway had first been opened in 1842 merely as a link between Manchester and Crewe, a proposed line through the Potteries, with a branch to connect with the Grand Junction, having been abandoned by arrangement with that company.

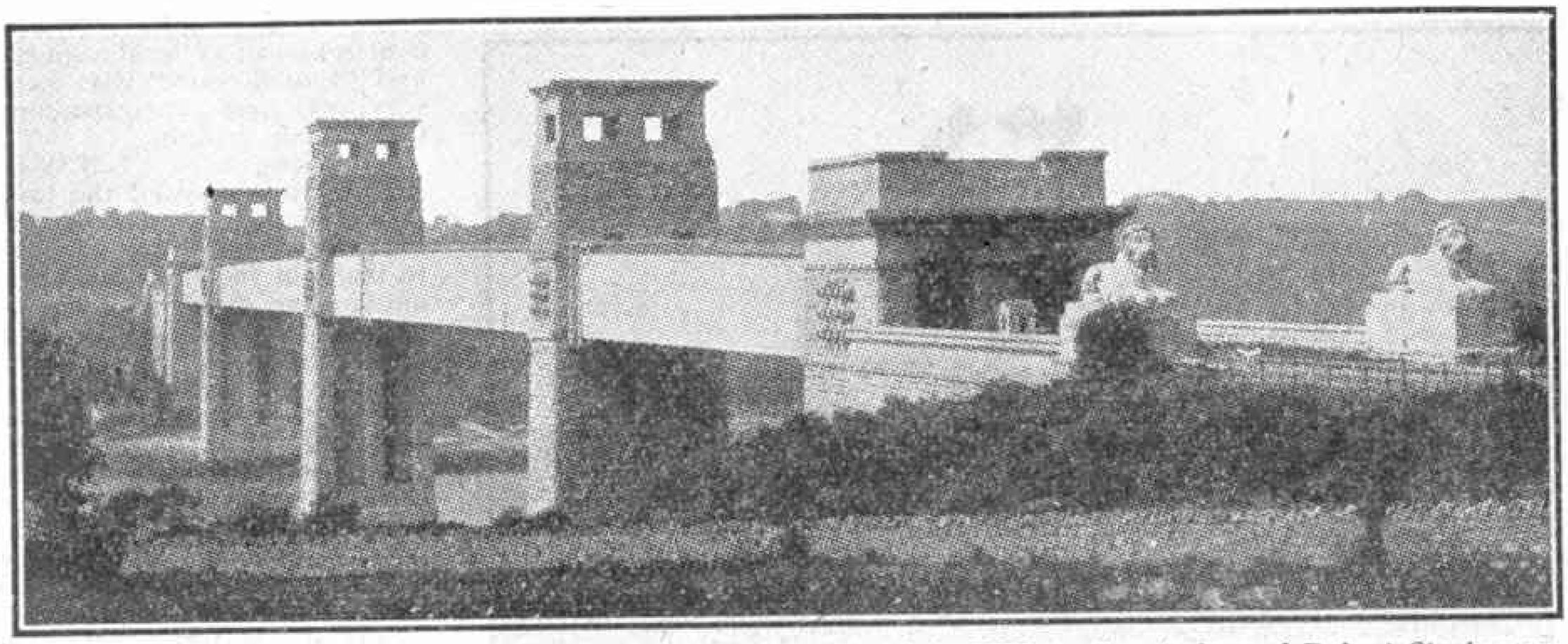
The year 1847 was a notable one, for then began the alliance of the L.N.W.R. with the Caledonian Railway, resulting in the establishment of the through West Coast Route to Scotland after the Caledonian had been completed to Edinburgh and to Glasgow in 1848. The journey first took over 15 hours, but this was soon reduced, and after some variations settled down to a time of 12½ hours. Actually at that time the L.N.W.R. ended at Preston, the trains passing thence over the Lancaster and Preston line, opened in 1840, and the Lancaster and Carlisle, which was opened first in September 1846 and throughout to the Border City in December of the same year. It was not formally amalgamated until 1879, although it worked in close association with the growing North Western throughout.

The Trent Valley Line from Rugby to Stafford also was opened in 1847, thus enabling trains to and from the North to avoid Birmingham and giving a more direct route. To the East, L.N.W.R. interests in Yorkshire took shape with the taking over of the Manchester and Huddersfield and the Leeds, Dewsbury and Manchester Railways, resulting in the establishment of an important cross-country main line.

By 1858 the Chester and Holyhead, which had been opened throughout in 1850 and worked by the L.N.W.R., was taken over. This gave the company a through route from London to the Isle of Anglesey for the important Irish traffic and included in its engineering works the Britannia tubular bridge built by Robert Stephenson over the Menai Straits. To Central and South Wales too, L.N.W.R. interests gradually extended so that ultimately, with various latter-day developments in branch and joint lines, the total route mileage of the L.N.W.R. was over 2,000 miles. The final big amalgamation, increasing this total by another 600 miles, dated from 1st January 1922, when the fusion of the L.N.W.R. with its old friend the Lancashire and Yorkshire took place. The period that was to elapse until the large scale grouping of 1923 was too short, however,



An early "Crewe" passenger locomotive of the kind introduced by Alexander Allan, almost in its original condition.



The Britannia Tubular Bridge over the Menai Straits completed in 1850 to the design of Robert Stephenson. Note the lions guarding the entrance.

for many practical developments to be noted, at all events by the "outside" enthusiast.

The historic interest of Euston tended to give the L.N.W.R. headquarters something of an indefinable "atmosphere." This was helped no doubt by the classic pillared entrance, the iron gates on which the Coat-of-Arms of the London and Birmingham Railway may still be seen, and by the statue of George Stephenson in the Great Hall; what other station can boast a Great Hall? It must be confessed, however, that grand though the entrances of Euston and other L.N.W.R. stations were, and still are, the station interiors frequently were much more utilitarian than attractive. One recalls, for instance, the bare platforms of Euston itself, of Lime Street, Liverpool, and of New Street, Birmingham.

At these rather elementary "parades," to use the term applied to the original Euston platforms by the London and Birmingham Railway, there has been dealt with over the years a remarkable series of trains, direct forerunners in many cases of the L.M.S. services of modern times. There was for instance the "*Irish Mail*," not a particularly fast train, but with its own special importance as a boat train and mail express. The morning, afternoon and night up and down Scottish expresses were the parents of the L.M.S. "Scot" family of trains, the traditional 10 a.m. departure time of "*The Royal Scot*" dating back to 1862. The "2 p.m." was the forerunner of "*The Mid-day Scot*" of modern times. This train was long known familiarly as "*The Corridor*," a term that has persisted amongst the staff, because it was the first on the line to have corridors throughout. It became a dining car train in 1893, and its special reputation was emphasised in 1908 when it was provided with a handsome and luxurious set of 12-wheeled vestibuled cars that were quite the best things of their kind at the time.

Then there were Liverpool and Manchester expresses to and from Euston, the Manchester service being selected in 1889 for the distinction of conveying the first L.N.W.R. dining cars, which true to tradition were originally first class only. Soon afterwards the same facilities were available on Liverpool trains. The services to these two cities had various points in common and even in 1902 a time of 3½ hours to Manchester was in force, the Liverpool timing being 3¾ hours. Then in 1905 non-stop runs commenced down to Edge Hill and to Stockport, on the Liverpool and Manchester services respectively, which provided the basis of the running of the "*Merseyside Express*" and the "*Lancastrian*" of L.M.S. days.

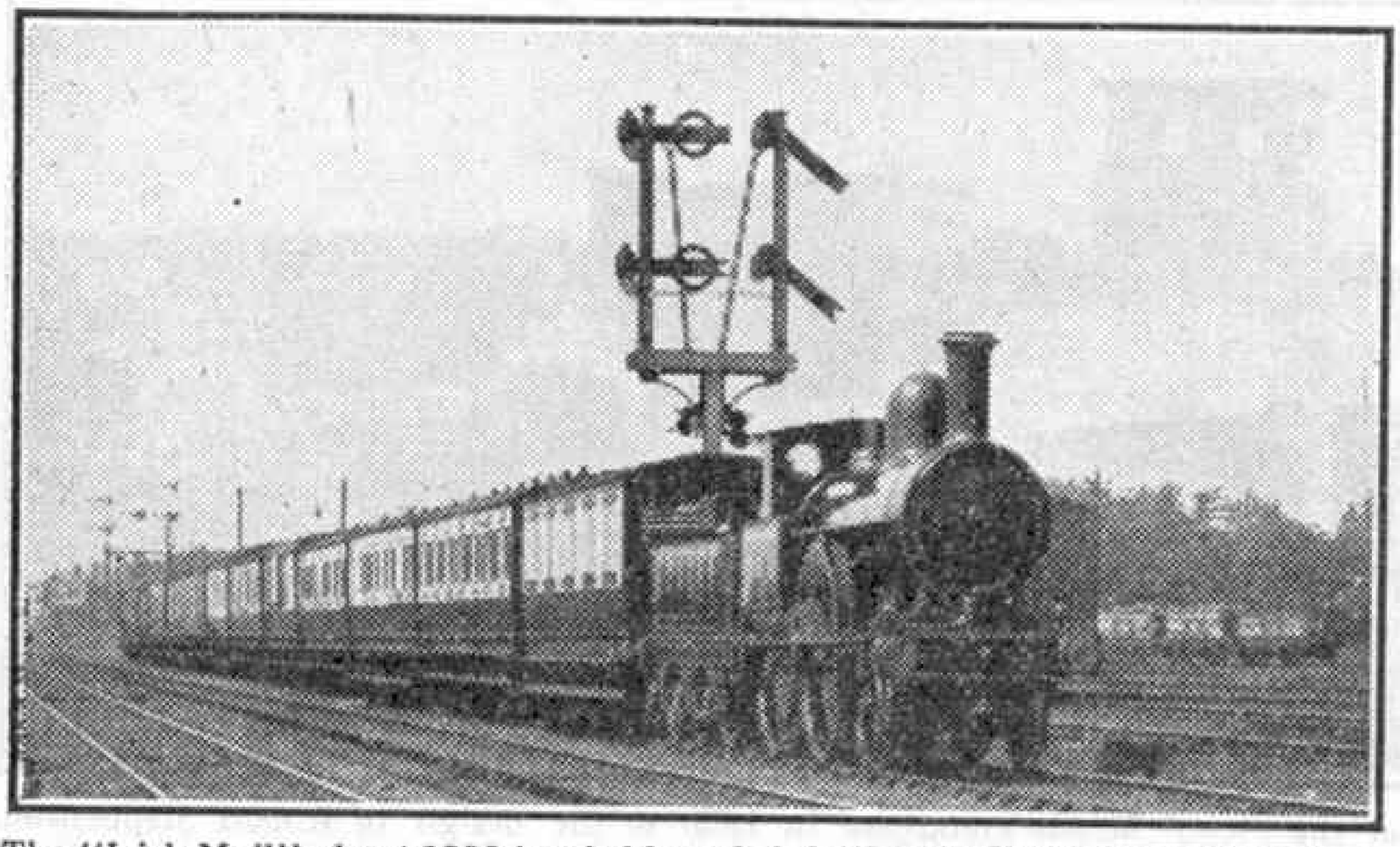
Notable too were the two-hour Birmingham non-stops, introduced in 1905 as a standard, though there had been a single two-hour train in 1902. Later years saw the introduction of intermediate stops within the two-hour schedule and this paved the way for the tight point-to-point times of the L.M.S. period.

An L.N.W.R. or, more correctly, West Coast institution that is unchanged in character is the "*Postal*" or to give it its full official title the "*Down Special T.P.O.*," and its corresponding up service. This began to run as an exclusively postal train in 1885, and the vans used even then were provided with corridor connections throughout.

In the days when the cream of the American liner traffic was handled via Liverpool the "American Specials" of the L.N.W.R. were a familiar sight on the main line. From 1895 these were run direct to and from Riverside, the station built specially for the purpose right on the Liverpool quayside. Accommodation of special character was the rule, and the trains provided for this service in 1907 were vestibuled throughout, including even the end brake vans. Uniform in build, the complete trains presented a splendid appearance. The passenger vehicles were 12-wheelers, as were so many of the L.N.W.R. special vehicles; but the service vehicles, which included a kitchen car, were eight wheeled.

Over a considerable period the trains of the L.N.W.R. were not remarkably fast in spite of the splendid character of most of the main lines from the point of view of the gradients. By degrees, however, progress was made, and by 1883 one of the up Birmingham trains made the fastest run on the line, from Northampton to Willesden, at 51.6 m.p.h. start to stop. Similarly in later years the fastest train on the L.N.W.R. was again one of the "Birminghams," which ran from Willesden to Coventry at all but 58 m.p.h. In regard to the Scottish through services, it needed the stimulus of the 1888 "Race to Edinburgh," prompted by the action of the rival railway kingdoms of King's Cross and York, to bring about an improvement in the time from 10 hours to 8½ hours for the through journey. A general trend towards higher average speeds, set in, however, and together with the introduction of dining cars and corridor stock the foundations of the L.M.S. express services of the immediate pre-war period may be considered to have been laid in the nineties and the early nineteen-hundreds.

The L.N.W.R. through Scottish services were unaffected by the speeding-up movement, on account of an agreement as to schedules between the East Coast and West Coast routes after the extraordinary 1895 "Race to Aberdeen." In this the culminating performance on the L.N.W.R. was a run from Crewe to Carlisle at an average speed of 67.2 m.p.h.! This was performed by a 2-4-0 locomotive even then of modest dimensions, one of the once familiar "Jumbos," No. 790 "*Hardwicke*." This engine remained in service into the L.M.S. period and when withdrawn from service it was not broken up, but



The "Irish Mail" about 1900 headed by a 2-4-0 "Jumbo." The signals shown are typical of L.N.W.R. practice. Photograph by courtesy of the L.M.S.

it is most fortunately preserved at Crewe.

A feature of L.N.W.R. locomotive practice for many years was the maintenance of two separate Divisions, Northern and Southern respectively, each with its own main works and Locomotive Superintendents. The Northern Division headquarters was Crewe and the Southern Division works at Wolverton. Until the unification of control in 1862 quite different policies were followed in the two Divisions. Wolverton on the whole favoured the "big" engine, and the large single-drivers produced under James McConnell enjoyed a special reputation. On the other hand Crewe designs were small, right from the time of the first Allan engines that created a definite "Crewe" type. This "small engine" idea persisted so that throughout L.N.W.R. history the locomotives had to be worked hard.

Locomotive compounding had a long trial on the L.N.W.R. during the Webb regime at Crewe and, although individual engines performed well at times, the work of the compound passenger engines was not altogether satisfactory. A great change over to simple engines again came about on Webb's retirement in 1903, but the compounds had not entirely disappeared by the formation of the L.M.S. The "Precursors" and "Experiments," 4–4–0s and 4–6–0s respectively provided the basis of the later superheater "George the Fifth" and "Prince of Wales" classes, the work of which in their prime was outstanding. By comparison the long-awaited "big engine" which ultimately materialised in the shape of the four-cylinder 4–6–0 "Claughton" class of 1913, had an indifferent reputation. Much heavy work was done by these engines as a class however and individual performances at times were brilliant. They remained in firm possession of L.N.W.R. main lines until the "Royal Scot" era, though they had been partially ousted by the Hughes "Dreadnoughts" of Horwich origin, at least on the Northern main line.

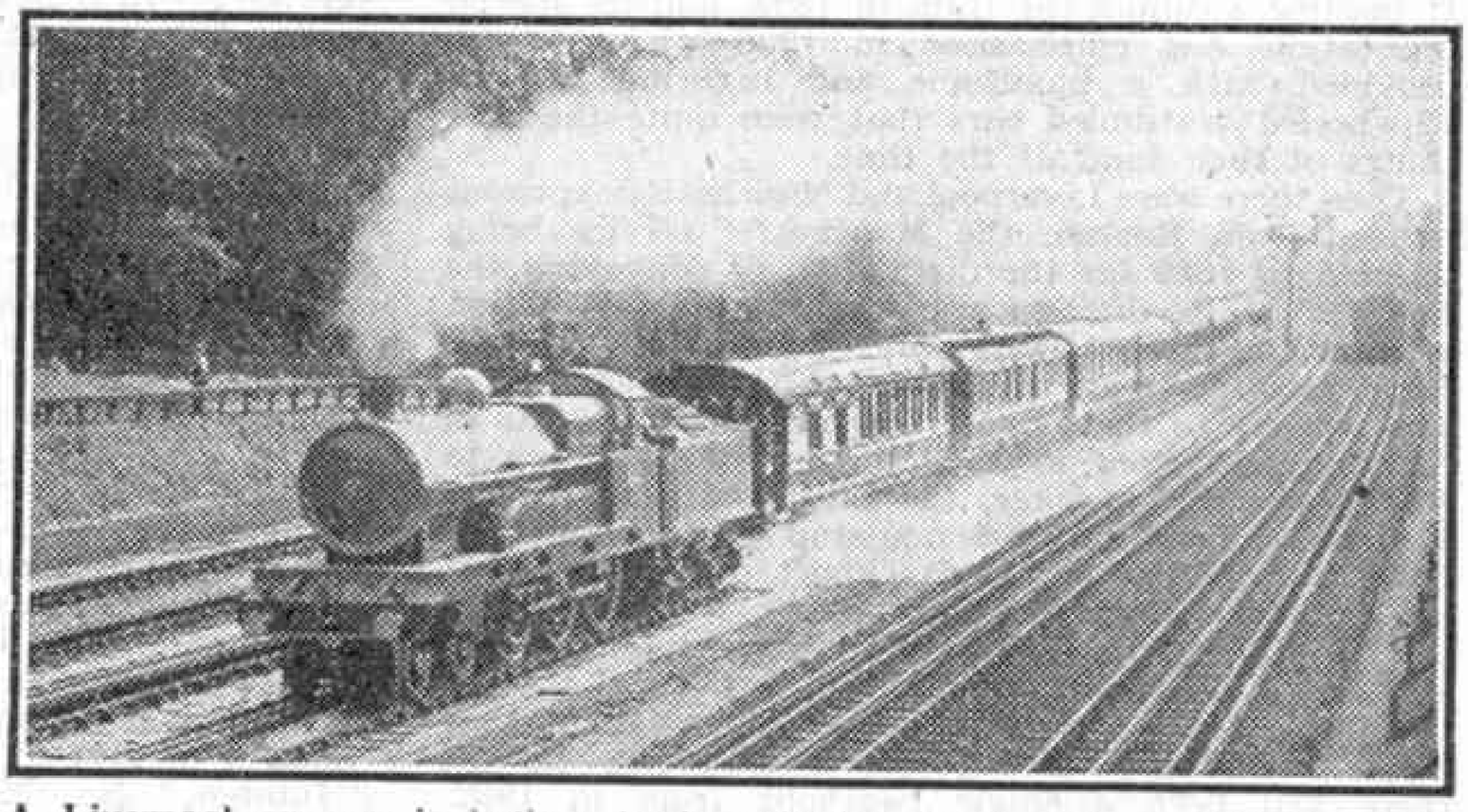
Although most of its express passenger engines have by now been withdrawn, large numbers of ex-L.N.W.R. goods engines remain in L.M.S. service, notably the ponderous 0–8–0s which are developments though several stages, both compound and simple, of the original Webb 0–8–0 of 1892. Some of their older relatives, 0–6–0s known as "coal engines" and "Cauliflowers," also have survived, and corresponding 0–6–2 tank designs.

At one time L.N.W.R. engines were painted the then almost universal dark green, but the colour was changed to black in the early seventies; and in the days when engine cleaning was a fine art the appearance of the glossy black livery was quite smart. The well-known purple lake and white finish of the coaching stock dated back to quite early times and it can still be seen on the Royal Train which was constructed by the L.N.W.R. in 1903 and is still used to-day.

Special features of the L.N.W.R. were its signalling, and its permanent way on which it prided itself. Main line signals were often very tall, invariably well sited and of characteristic appearance. The semaphores were steel and the posts had caps shaped like a very shallow pyramid instead of the usual ball and spike. The arms relating to separate goods or slow lines alongside the main lines were distinguished by large rings.

Steel rails were a Crewe product in the early 1860s and 60 ft. rails were introduced on the L.N.W.R. and adopted as standard in 1894. Other details of present-day practice can be traced to L.N.W.R. origin, for that company claimed "the finest permanent way in the world." For many years it was the only line to use track water troughs, which were patented in 1860 by John Ramsbottom, then Locomotive Superintendent at Crewe. The first troughs were laid down at Aber in North Wales to allow of an acceleration of the *"Irish Mail."* Further installations were made throughout the main lines and one of these, just south of Tebay Station in Westmorland on the line from Crewe to Carlisle, is shown on this month's cover.

The traditions of the steamers of the L.N.W.R. have been carried on by the efficient "ships of the narrow seas" of the L.M.S. Apparently the earliest steamers were those provided by the Chester and Holyhead Railway between Holyhead and Dublin. In 1860 the mail contract passed into the hands of the City of Dublin Steam Packet Company, but the L.N.W.R. still provided steamship services of its own. Subsequently the Dublin company lost the mail contract and this was taken over by the L.N.W.R.



A Liverpool express including twelve-wheeled stock with a "Claughton" locomotive on Bushey troughs.

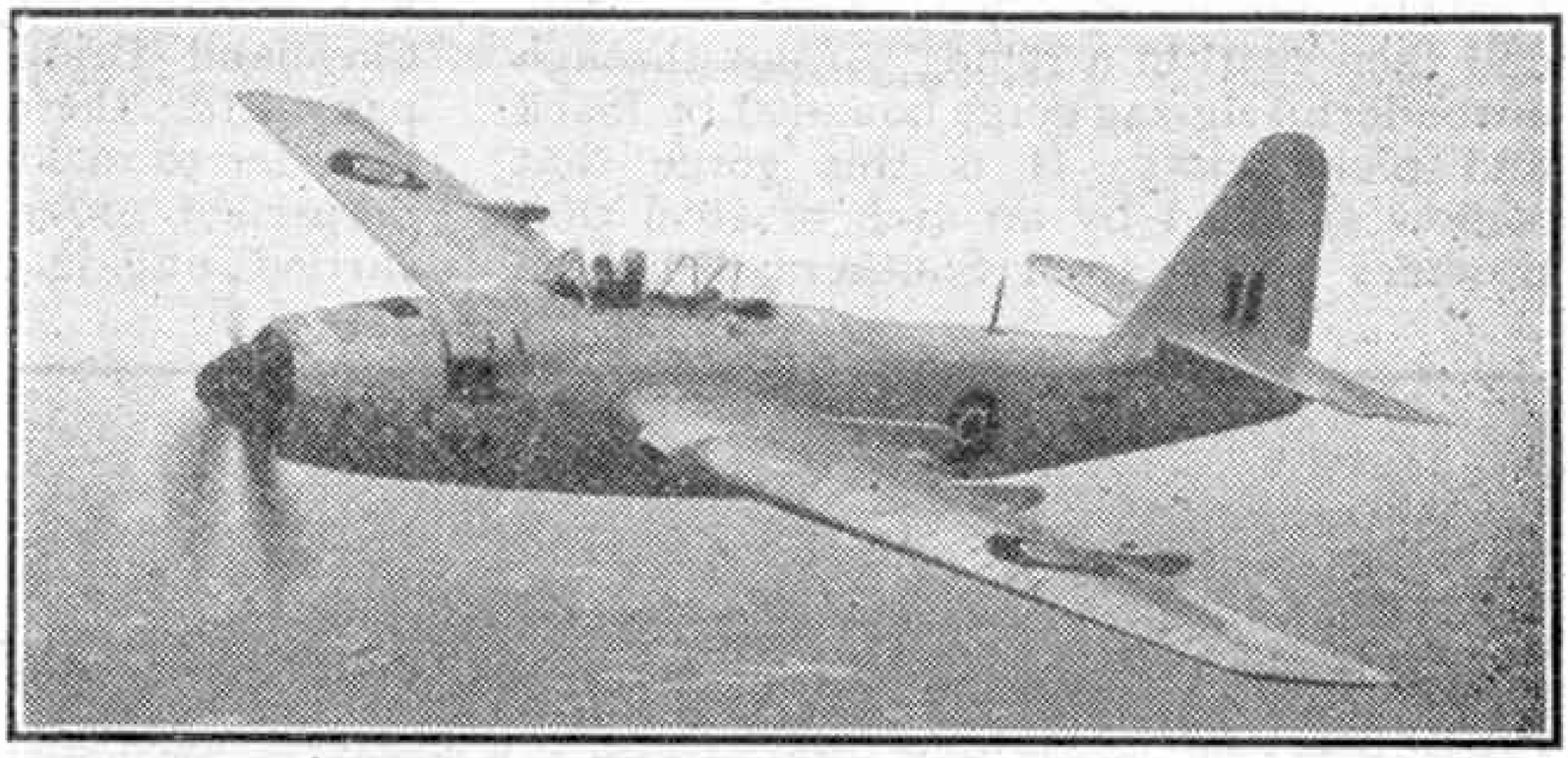
The Fairey "Spearfish"

By John W. R. Taylor

"SWORDFISH" . . . . "Albacore" . . . . "Barracuda"—what a debt we owe to these wonderful Fairey torpedo bombers. Taranto, the "*Bismarck*" action, Malta, North Africa, the gallant but hopeless attack on the "*Scharnhorst*" and "*Gneisenau*" in the Channel, the "*Tirpitz*," Surabaya, are just a few of the battle honours won by the immortal "Stringbags" and its successors.

Now a new Fairey torpedo bomber is in production, with a better all-round performance than any other aircraft in its class anywhere in the world—the "Spearfish." It is a large aeroplane, in fact its wing span of 60 ft. 3 in. and loaded weight of 21,642 lb. make it the biggest aircraft yet ordered by the Royal Navy. But in spite of its size it has a top speed of nearly 300 m.p.h. and handles well both in the air and on the ground. It is powered by a Bristol "Centaurus" C.E. 58 engine, which has a take off power of 2,800 h.p. with methanol injection.

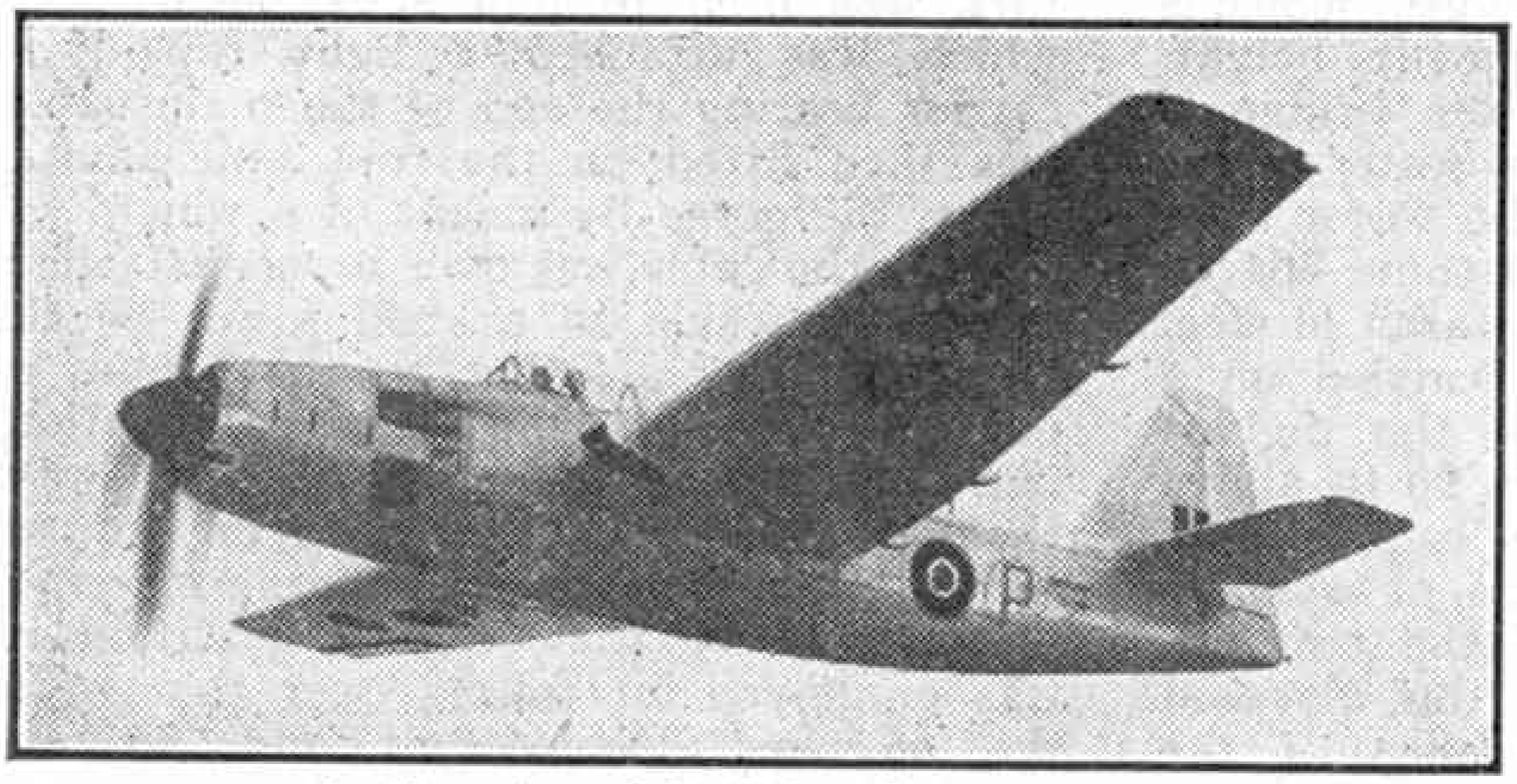
The "Spearfish" carries a crew of two, the observer looking after all the complicated navigation, radio, radar and bomb or torpedo dropping equipment in the rear cockpit. In addition he has a remotely-controlled Frazer Nash barbette, mounting two .50 in. Browning guns for tail defence. Two other "point fives" are mounted in the wings, firing forward, and 16 rocket projectiles can be carried under the wings to supplement the normal offensive load. The latter can consist of either an 18 in. or 22.4 in. torpedo, four 500 lb. bombs, one 1,600 lb. or 2,000 lb. bomb or four depth charges. Alternatively 30 multi-flares or a 180-gall. long range fuel tank may be carried.



Fairey "Spearfish" torpedo bomber, the largest aircraft yet ordered by the Royal Navy.

The prototype, which is shown in the illustrations on this page, was built as a test machine for a lot of new ideas that Faireys wished to try out. In the past naval torpedo-bombers have been the "Christmas-tree" designer's paradise, with bombs, torpedoes, radio and radar equipment all hung on outside. The "Spearfish" has altered all that as its bombs or torpedo are carried internally, a special ejector arm being fitted to throw the bombs clear of the propeller in a dive-attack. Special large Youngman high-lift wing flaps give the aircraft the low stalling speed so essential for landing on a carrier, especially in a choppy sea. Similarly the sweep-down of the fuselage from the cockpit to the neatly cowled engine gives the pilot an excellent forward vision for "landing on." The undercarriage of even the indomitable "Swordfish" sometimes collapsed in a

(*Continued on page 304*)

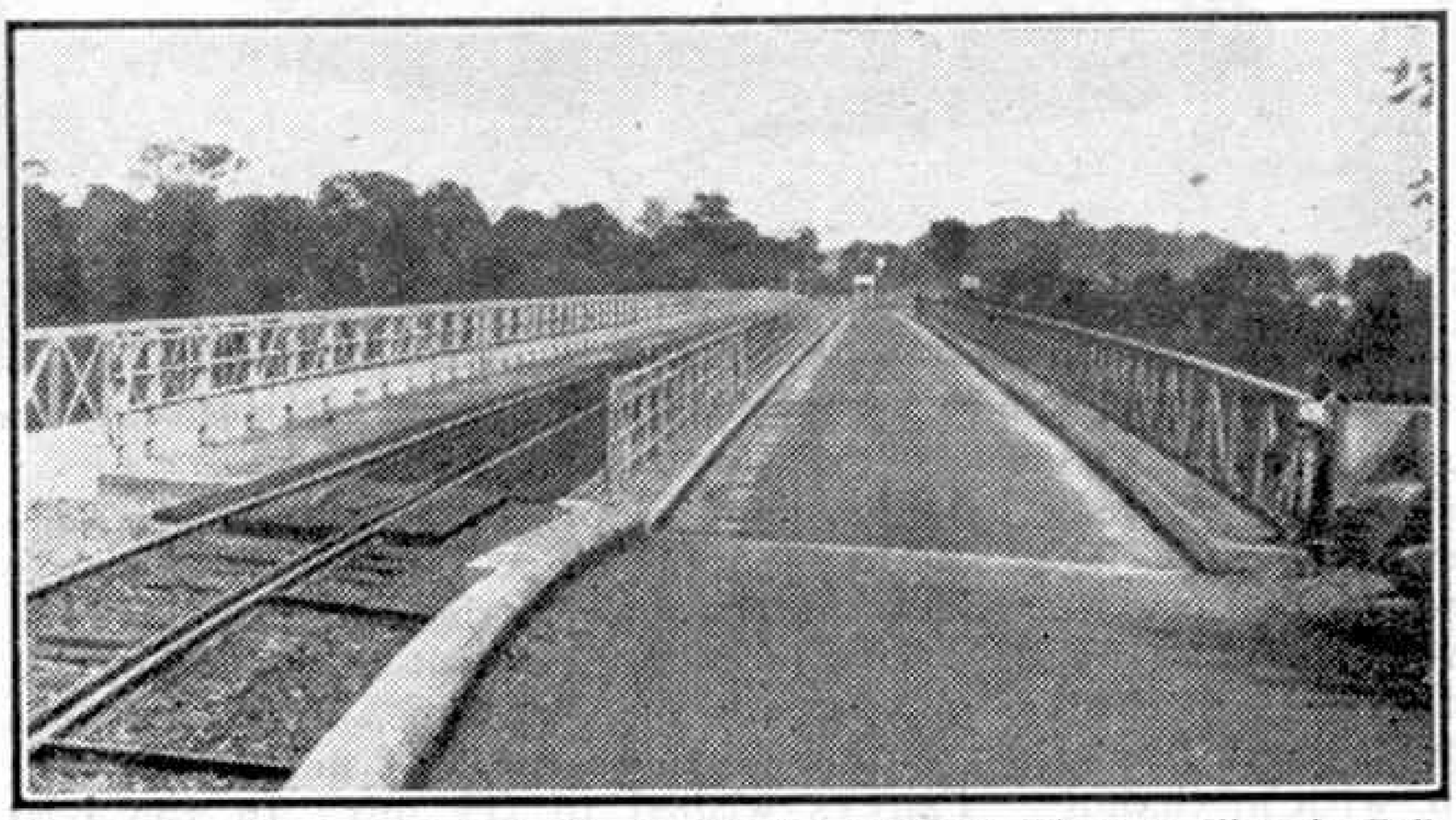


Another view of the "Spearfish" in flight.

The Victoria Falls Bridge

By Stephen Orme

ONE of the most remarkable bridges in the world is that over the gorge below the Victoria Falls of the Zambesi River. This famous African river separates Northern from Southern Rhodesia, and just above the Falls it is more than a mile in width. Its waters plunge into a gigantic chasm over 100 yds. in width, throwing up an enormous cloud of spray, and then swirl in a raging torrent through a wonderful zig-zag gorge bounded by black and rocky cliffs. It is this gorge that is now spanned by an arch of steel that provides access from Southern Rhodesia into the heart of the African continent. The bridge was built at the beginning of the present century to carry the railway across the river, and nearly 30 years after its construction it was widened to provide a road and sidewalks for pedestrians.



The road, railway and footpath across the Zambesi River at Victoria Falls, Southern Rhodesia.

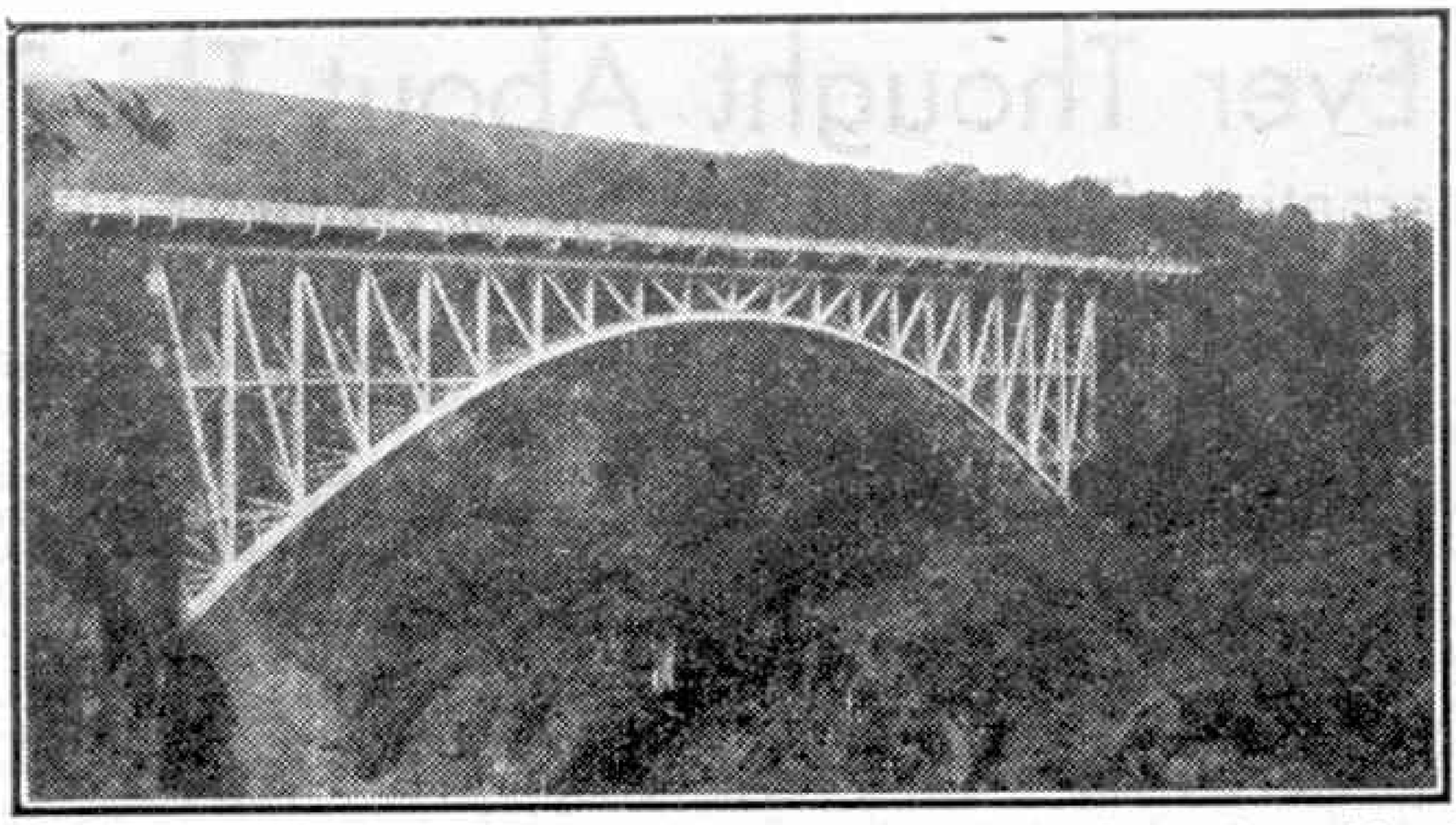
Crossing the bridge is awe-inspiring, not so much because of its length, which is about 650 ft., as on account of its height. Even in the flood season the bridge is 310 ft. above the level of the water in the gorge below it, and when the water is at its lowest there is a drop of some 364 ft.

The structure is a gigantic arch of steel with the rail and roadway carried on a horizontal top chord above the highest point of the arch, which rises 90 ft. above the level of the bearings on each side of the gorge. There are 20 panels, or sections, each 25 ft. in length, and the two uprights of each panel with the diagonal bracing give it the appearance of the letter N. The bridge is about 700 yds. below the actual Falls, and there are three spans to the entire structure, the central arch of 500 ft. being flanked by an approach span of 62 ft. 6 in. on the north bank and another of 87 ft. 6 in. on the south.

The whole of the steelwork of the bridge was fabricated in Darlington, and was erected there in the works of the Cleveland Bridge and Engineering Company Ltd., the constructors of the bridge, in order to make sure that every part was in perfect order. This trial erection was carried out in parts, and then all the sections were numbered to mark their places in the final structure, and packed up for the long journey to Central Africa.

In the meantime the necessary preparations had begun at the site. The railway was then being pushed northward through Southern Rhodesia to the Falls, and at last this reached the river bank. Then came the problem of crossing the chasm to be bridged. This could not be done by boat, so it was decided to erect a cableway with a span of 870 ft. to cross the gorge at the site of the bridge. The actual cable weighed 5 tons and consisted of 19 steel wires wrapped round a core of hemp. In order to get it across the gorge a rocket was first shot over to carry a light cord, which in its turn was used to pull across a wire to which was attached a light rope. A carrier bearing the end of the main cable was then fitted on the rope and hauled across the gorge by means of a winch.

Once the cable was over it was attached on the one side to a steel tower 36 ft. high and on the other to the top of a pair of sheer-legs hinged to foundation plates bedded in concrete. The cableway then provided means of carrying across to the north bank bridge-building material in loads of 10 tons, and in addition it was employed for taking over the gorge the sleepers, locomotives and wagons required by the contractors. The conveyor



A general view of the Victoria Falls Bridge, seen from the northern side of the Zambesi.

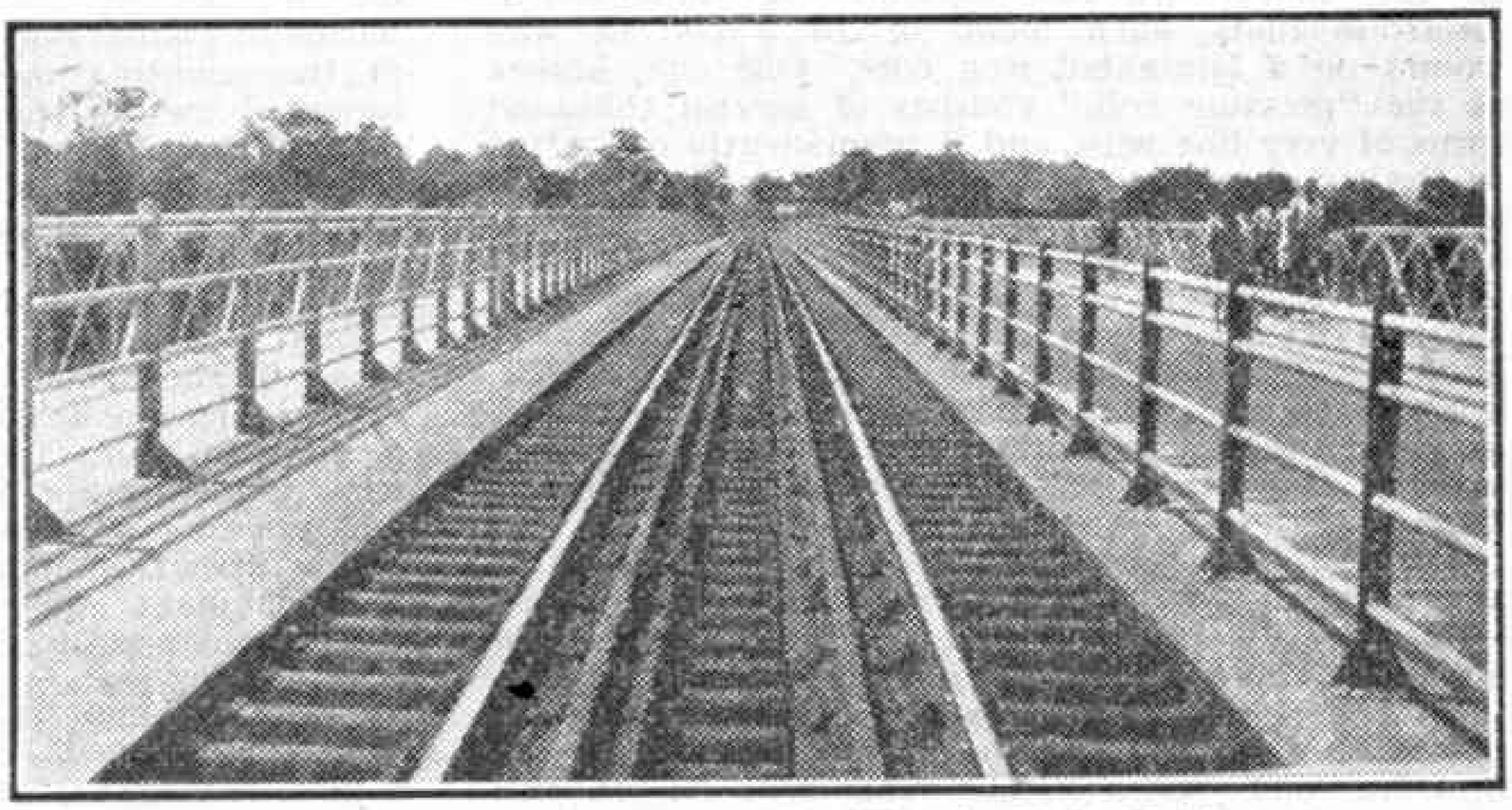
employed was also a travelling crane, capable of raising and lowering its load as required as it ran along the cable. It was operated electrically, power being supplied from a generating station on the cliffs.

The laying of the reinforced concrete foundations for the main bearings was started in May, 1904. The north bank proved to be solid, and on that side it was comparatively simple to excavate and level the ledge on which the two bearings at that end of the bridge were to rest. On the southern side the site proved to be a mass of big boulders and loose material, and this had to be removed before filling up the site with concrete.

When the concrete foundations were complete and the bearings for the bridge had been fixed in position, the construction of the main span began. Some means of supporting the growing masses of steel projecting outward had to be provided in order to prevent their weight from tearing the shore spans away from their anchorages. Behind the end posts therefore shafts about 30 ft. deep were dug and the bottoms of those on each bank were connected by means of short tunnels. This made eyes through which steel wire ropes were threaded, and the ropes ended in screwed sockets that were attached by means of U-bolts to pins at the tops of the end posts. A sufficient number of the steel wire ropes was used on each side to hold up the steelwork until the ends of the two halves of the bridge met and could be riveted together to form a rigid structure.

For the erection outward of the steelwork, electric cranes were mounted on the cross girders to allow for rapid handling, and the two halves of the bridge grew outward over the river with surprising speed. A safety net was stretched out below the growing bridge to catch any workman unfortunate enough to lose his hold as he clambered over the steel skeleton while guiding girders into position as they were lowered from the cableway carrier and riveting them together, but not a single man fell into this during erection. Indeed the men at work complained that the sight of the net actually made them feel nervous.

The panels at the centre of the arch were completed at sunset on 31st March 1905 and at the moment when the two halves met they overlapped by just over an inch. At sunrise next morning, when work was resumed, the two ends met exactly, for the steelwork had contracted as the temperature fell during the night. The ends were then forced apart by means of hydraulic jacks, and steel plates were fitted into the gap. Then the giant bridge stood firmly on its bearings and the steel wire ropes that had supported the steelwork during (*Continued on page 304*)



Looking southward across the Victoria Falls Bridge.

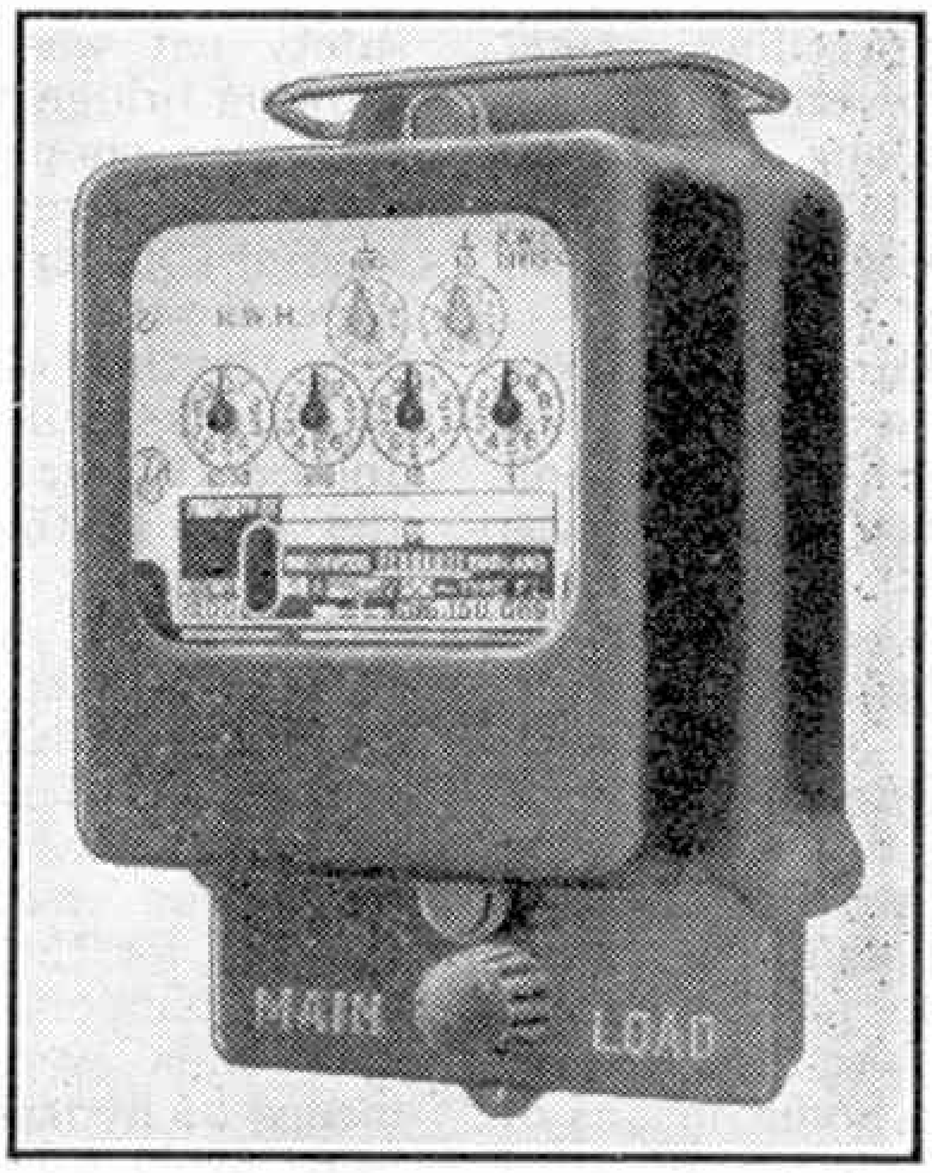
Have You Ever Thought About This?

How an Alternating Current Electric Meter Works

By T. R. Robinson

AN electric meter, which measures and records the current used, is part of the equipment of every building that has its lighting or power wiring connected to the electricity supply mains. Although there are millions of these efficient little instruments at work every day, the average user of electricity knows very little about them. The working of the kind of meter used for recording consumption of alternating electric current, the most common type in use, is explained in this article.

An electric meter is really one of the most ingenious and reliable of electrical instruments, often giving years of service without any attention, and withstanding very bad conditions of dirt and damp. Before dealing with the way in which it works, however, we should understand just what it has to do. It must record the amount of current flowing in the circuit to which it is connected, and also how long the current flows. To do this it must have a standard of measurement, and the standard chosen is the "kilowatt-hour," a term meaning that one kilowatt of electricity flows through the circuit for a period of one hour. If the flow is two kilowatts for half-an-hour, half a kilowatt for two hours, or any other corresponding proportion, the total will still be one kilowatt-hour, and the meter is constructed to deal with these variations, and to give the correct total of kilowatt-hours, no matter how the current may have varied.



The working of an electric meter such as this is explained in the accompanying article. Photograph by courtesy of Ferranti Ltd.

The most effective way to record the number of kilowatt-hours is to measure the amount and duration of the current, and in a meter this is done by making the current drive a special type of electric motor coupled to a counting mechanism. In this motor are two separate and independent electro-magnets, each made up of a coil of wire wound on a laminated iron core. One coil, known as the "pressure coil," consists of several thousand turns of very fine wire, and is permanently connected to the supply mains so that a very small current is always flowing through it. The other coil, which is called the "series coil," is made up of a few turns of thick wire, and is so connected that current flows through it only when some appliance, such as a lamp, electric fire, radio set, or something similar, is switched on. The two electro-magnet cores are arranged one above the other, with their poles pointing towards each other, but with a small gap separating them.

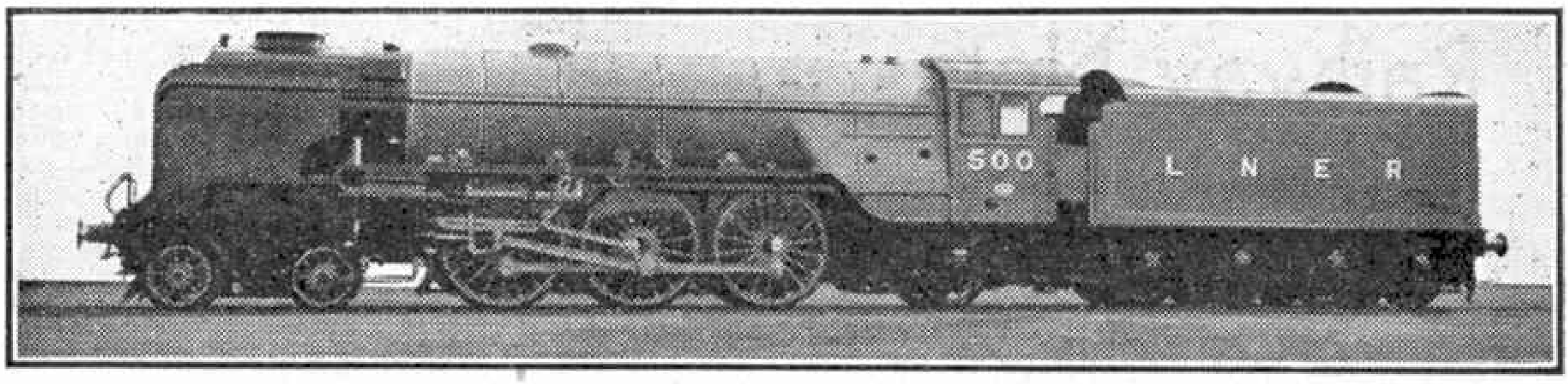
The rotating part of the motor consists of an aluminium disc, mounted on a vertical spindle pivoted to revolve in bearings that are as frictionless as possible. The bearings of the disc are so positioned that a part of the disc near to its circumference passes through the gap between the poles of the pressure and series electro-magnets. At another point around its circumference, the disc also passes through a similar gap, but in this case it is formed by the poles of a strong permanent magnet, known as a "brake magnet."

As the pressure coil winding is always connected to the supply mains, the magnetic field set up in its core acts upon the disc all the time, but the disc does not revolve while this coil is the only one in action. As soon as any appliance is switched on, however, the current used by it flows through the winding of the other, or series, coil, setting up a second magnetic field in its own core on the opposite side of the disc. The effect of these two magnetic fields acting together is to produce a force that causes the disc to revolve.

As the disc starts to turn, the brake magnet comes into action, for when the edge of the disc rotates between the poles of this permanent magnet, its field produces a force that retards the movement of the disc. This retarding effect is proportional to the speed. The result is that when any appliance is switched on, the disc will start to move, and will accelerate until a point is reached where the driving and retarding forces balance, at a speed which depends on the amount of current flowing in the series coil. When this occurs, the speed of rotation will be directly proportional to the current passing through the appliance in use, an increase causing faster rotation of the disc and a decrease having an opposite effect. It is this that makes a motor of this kind so very suitable for the sort of measurement that a meter has to do, and by designing it correctly the disc can be made to turn so many times for each kilowatt-hour.

The mechanism that counts the rotations of the disc records the necessary kilowatt-hour readings by means of pointers on a series of dials. The first wheel of the counting mechanism is driven by a worm mounted on the spindle of the motor disc, and the rest of the reduction gearing necessary for the various pointers is made up of ordinary toothed wheels and pinions. Each stage of the gearing between the pointer spindles of adjoining dials has a ratio of 10 to 1, and so the dials indicate successively "ones," "tens," "hundreds," "thousands," and sometimes tens of thousands of kilowatt-hours. Other small dials, indicating tenths and sometimes hundredths of a kilowatt-hour, are also provided, but these are usually for testing purposes only, and their figures and pointers are coloured red to prevent any confusion with the main dials.

Prepayment meters are fitted with an additional mechanism permitting current to be used only when a coin of a certain value has been inserted in the appropriate slot. The insertion of the coin closes a switch, and sets forward the prepayment mechanism a definite distance in relation to a special additional counting mechanism.



L.N.E.R. 4-6-2 No. 500, the 2,000th locomotive to be built at Doncaster. Photograph by courtesy of the L.N.E.R.

Doncaster's 2,000th Locomotive

Eighty Years of Progress

"*LONDON North Eastern Railway Co. No. 2000 Doncaster 1946*"; so runs the legend on the neat Works plate attached to the cab of the first new Thompson "A2" class "Pacific" No. 500. This was turned out late in May this year. The number 2000 is the Works serial number, showing that No. 500 (this is the engine's running number) is the 2,000th engine to have been built at Doncaster. Behind this figure lies a remarkable story of progress. Two thousand engines; quite a tall order, and one that has taken since 1867 to complete, for it was in that year that the Doncaster "Plant" of the former Great Northern Railway produced the first engine to be built there. Repairs, however, had been carried out since 1853 when the workshops were first established.

It is remarkable that during the 76 years of the existence of the Great Northern Railway there were only four locomotive superintendents. At grouping in 1923 the holder of the office, Mr. (afterwards Sir Nigel) Gresley, was appointed Chief Mechanical Engineer of the L.N.E.R., and this position he retained until his death in 1941. He was then succeeded by Mr. Edward Thompson whose retirement has just been announced. This continuity of control has had its effect on the locomotive stock, and it is noteworthy that during the respective periods of Stirling, Ivatt and Gresley, one principal design of express locomotive, successively developed by each engineer, held the road.

In the construction of No. 500 the most up-to-date machining and welding technique has been applied to this worthy successor of the long line of its forerunners. Three-cylinder propulsion is retained as in previous "Pacifics," each cylinder being 19 in. by 26 in., but the drive is now divided between the first and second coupled axles. Also there is a separate set of Walschaerts valve gear to operate each 10 in. piston valve, in place of the conjugate arrangement followed in the three-cylinder engines of the Gresley pattern. This new layout of cylinders and valve gear has been adopted in order to avoid some of the stresses on the crank axle, and it is expected that this component will have a longer life than on the previous engines where the whole driving load is concentrated on one axle. Similarly, the use of independent valve gears enables larger valves to be used and maintains a better steam distribution during the period between major repairs than was feasible with the previous arrangement. The driving wheels are 6 ft. 2 in. in diameter.

The boiler follows previous L.N.E.R. practice in the main, having a tapered barrel and wide fire-box with generous superheating surface and grate area. Working pressure is 250 lb. per sq. in. and the tractive effort of the locomotive is 40,430 lb. The capacious smoke-box, flanked by smoke deflectors, is crowned by a double chimney innocent of any lip or rim, thus following the general trend of "Pacific" practice developed in the Thompson regime. The smoke-box is fitted with a very large area mesh designed to keep it free from ashes over the longest journeys. Such is this 101 ton 10 cwt. giant, for the general external aspect of which we have been more or less prepared since the appearance of the other 6 ft. 2 in. "Pacifics" re-built from 2–8–2s.

The tender is an 8-wheeled vehicle. It is not of the corridor type, and a minor external detail that is a novelty, from Doncaster, is that the rivet heads are left protruding. The tender weighs 60 tons 7 cwt. loaded with 9 tons of coal and 5,000 gallons of water.

Doncaster's first engine was in striking contrast to its 2,000th. It was a Stirling mixed traffic locomotive of modest dimensions with the 0–4–2 wheel arrangement, and weighed only 31 tons 18 cwt. without tender. It had the then inevitable Stirling domeless boiler, and its crew enjoyed the luxury of a covered cab at the time when most British enginemen had no protection from the weather except perhaps a spectacle plate or weather board.

The Stirling "mixed traffics," which by a curious coincidence also were denoted by the class letter "A," were developed through successive batches from "A" to "A4" until they numbered over 150.

Many notable locomotives have been built at Doncaster since the appearance of its first design. One recalls that gallant veteran No. 1, the first Stirling 8-footer, which ran 1,400,000 miles from 1870 until 1907 when it was retired. Then 31 years later—in 1938—it figured in a theatrical come-back with a "period" train of 1888 to illustrate vividly the progress made in 50 years of development up to the new "*Flying Scotsman*" stock introduced in that year.

The 8-footers had a long innings on first-class passenger work, on which their direct successors, which held the field unchallenged nearly as long, were the Ivatt "Atlantics," another notable Doncaster product. What they accomplished as a class, especially after superheating, and the staggering feats of individual engines on occasions even in comparatively late years, will be familiar to many readers.

In the meantime the era of the three-cylinder locomotive had begun, which culminated as far as the G.N.R. was concerned in the appearance in 1922 of the first two Gresley "Pacifics." This type, like its 4–2–2 and 4–4–2 predecessors, remained the basis of further developments through various stages to the streamlined "A4s" of 1935. Now the Thompson "Pacific" has been evolved, still plainly a Doncaster product, but modified from traditional design in order to meet the particular conditions of to-day.

The Directors of the L.N.E.R. have honoured their retiring Chief Mechanical Engineer by naming No. 500, his latest engine, "*Edward Thompson.*" Mr. Thompson is succeeded by Mr. A. H. Peppercorn, O.B.E., Assistant Chief Mechanical Engineer, who received his training at Doncaster.

Railway Notes

Irish Railways in Wartime and After

A very great contribution to the war effort was made by Northern Ireland during the recent momentous years, so railway traffic, both passenger and goods, has been exceedingly heavy. The same report applies to a considerable extent to the Great Northern system, which also operates in Eire and forms the main line between Belfast and Dublin. Restaurant and buffet cars have been run throughout the emergency by the Great Northern, and although express timings have been decelerated there was little permanent reduction in train service.

There was of course little opportunity to augment rolling stock supplies, though the Belfast and County Down Company obtained a new 4–4–2T, No. 9, in 1945 from Beyer, Peacock and Co. Ltd. For the Northern Counties Committee (L.M.S.) a few powerful 2–6–0s were built at Belfast to the standard design of the No. 90 or "W" class, with 6 ft. driving wheels and 200 lb. per sq. in. boiler pressure. As the rail gauge is 5 ft. 3 in. on all Irish lines, other than narrow gauge small systems, locomotives have to be specially built for service on them, even if modelled on a British mainland type. Two 0–6–0Ts of the standard L.M.S. "3F" class have gone to the N.C.C., while five 2–6–4Ts are expected, the necessary adaptation of axles etc. having to be carried out in each case.

In Eire services had to be curtailed severely and were very slow owing to shortage of coal and spare parts. Several branch lines as well as country stations were closed, and it is doubtful if they will be reopened. The new Irish Transport Company, Coras Iompair Eireann, under partial State control has taken over administration of the Great Southern Railway, itself an amalgamation of various lines formed in 1925, as well as the Dublin United Transport Company, which operates both long-distance and urban bus and lorry services. Proposals are afoot regarding diesel-electric haulage on the railways, together with more development of light railcar services. Some of the interesting narrow gauge separate lines may be liquidated.

Throughout Ireland there are numerous old tender or tank locomotives of many types still to be seen, but scrapping is thinning their ranks, so camera and other enthusiasts would do well to seek them out as soon as circumstances permit.

G.W.R. No. 1017 "County of Hereford," on a Birkenhead-Paddington express, taking water from Ruislip troughs. The engine is one of the new 4-6-0 "1000" Class. Photograph by C. R. L. Coles.

The Hughes 4-6-0 Express Locomotives

As long ago as 1908, Mr. Geo. Hughes, then Chief Mechanical Engineer of that busy system the Lancashire and Yorkshire Railway, introduced a powerful 4-cyl. 4–6–0 express engine for the main line services between Manchester or Liverpool and York, Blackpool or elsewhere. In contrast to those of the large wheeled 4–4–2 and 4–4–0 inside-cylindered types that preceded them, the driving wheels of this engine were only 6 ft. 3 in. in diameter.

On the formation of the L.M.S. group in 1923, Mr. Hughes was appointed to supreme charge of the new Company's Locomotive Department, and under his direction another 41 improved 4–6–0s of what had been known as the "Dreadnoughts" were built between 1923 and 1925 as class "5P," numbered 10434–74. Those already existing became Nos. 10405–33, making a total of 70 locomotives. Some had 15¾ or 16 in. cylinders, but the newer standard was four 16½ in. ones, combined with 26 in. stroke, giving a decidedly large cylinder volume. Nine-inch piston valves were actuated by Walschaerts gear, the boiler pressure was 180 lb. per sq. in. and the heating surface was 1,910 sq. ft. with an additional 395 sq. ft. in the superheater. The tractive effort at 85 per cent. boiler pressure was 28,879 lb. The total weight of engine and tender in working order was 119 tons.

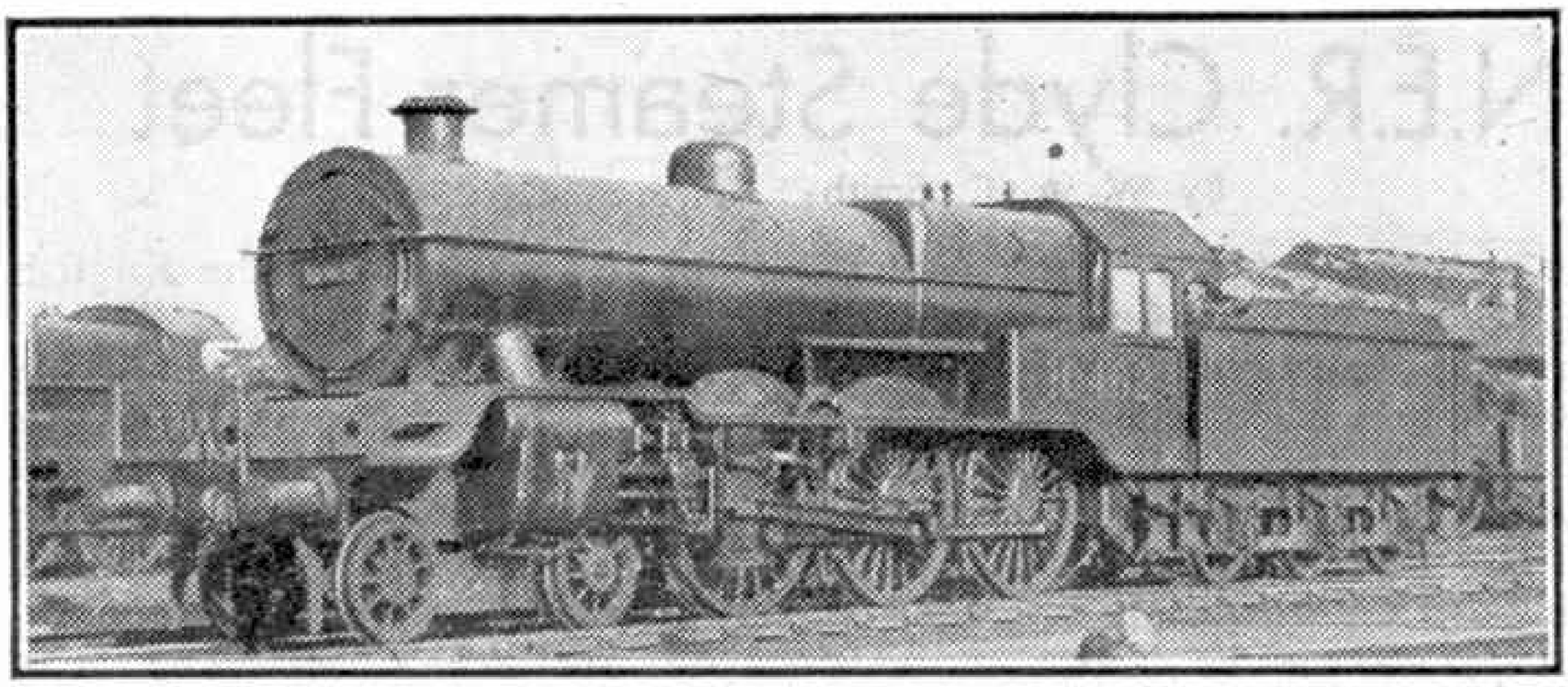
Though many of these big engines had a short life they rendered good service before the advent of the "Royal Scots" in 1927, as the most powerful express locomotives available for the hard grades between Manchester, Liverpool or Crewe and Carlisle. They were painted red. Withdrawal has been taking place gradually for some years and it is believed that only 10 now remain.

It may not be so generally known that one of the later examples, No. 10456, was from 1926 until withdrawal in 1936 a 4-cyl. compound in which the two inside cylinders, increased in diameter to 22 in., became the low-pressure ones into which steam was exhausted from the two outside, normal 15½ in. cylinders. Mr. Hughes' famous "Baltic" tank version was introduced in 1924, there being 10 numbered 11110–9, but all have by now been broken up. A "Pacific" tender design was prepared about that time, but not put into effect.

Southern Tidings

It is a pleasure to record the increasing number of passenger locomotives now in service painted light green with normal lining-out and numbers painted on the back of tender. "West Country" 4–6–2 engines up to 21C 129 were running in May and construction was continuing at Brighton.

All the first series of "A12" or "Jubilee" 0–4–2 mixed traffic locomotives have disappeared from traffic. Withdrawal is now announced of Nos. 599, 606, 623, 637, 644 and 649, belonging to the second batch constructed for the former London and South Western Railway in 1892–5 either by Neilson and Co. Ltd., Glasgow, or at the Nine Elms Works, London, which were superseded by the fine plant at Eastleigh. In their early days, these little engines, which had coupled driving wheels 6 ft. 1 in. in diameter in front, hauled the fast Waterloo-Portsmouth trains. Then they were prominent on the London-Reading line as well as in country districts of what



One of the Hughes 4-cyl. 4-6-0 express locomotives in L.M.S. colours at Crewe. Photograph by H. C. Casserley.

is now the Western Section, S.R.

Also on the scrapped list are "F1" rebuilt Stirling 4-4-0 No. 1060, originally built for the S.E.R. in 1891, and L.S.W.R. 0-4-4T No. 16, of the small "T1" class.

In 1944 nearly 2½ times as much traffic as in 1938 was dealt with at Exeter Central Station. This was mainly due to the adjacent military and Royal Marine depots, which produced half a million additional passenger journeys. Between Honiton and Exeter 600 special trains carried 350,000 American personnel to and from the city, while during the last year of war the freight marshalling yard handled 50,000 more wagons than in 1938.

G.W.R. Operating Notes

New "Castle" class 4-6-0 express engines under construction at Swindon will be numbered 5098–9 and 7000–7, thus continuing the sequence with "0" as the second figure; Nos. 60xx as far as 6029 are, of course, already carried by "Kings."

Additional "Hall" namings announced are: No. 6918 "*Sandown Hall*" and No. 6941 "*Fillongley Hall.*"

Engines condemned in April were: "Bulldog" 4-4-0 No. 3313 "*Jupiter*," of Newton Abbot shed; "Aberdare" 2-6-0 No. 2677, shedded at Aberdare; and old 0-6-0Ts Nos. 1287, Leamington; 1585, Aberdare; and 1624, Yeovil.

Hauled by three "Kings," ten "Castles," three "Stars," five new "Counties" and eight "Halls," 29 long-distance expresses arrived at Paddington on Easter Monday evening in about 4½ hrs., the busiest running in five portions. Many of the trains were heavily loaded and some of the sets of coaches were returned empty immediately to the provinces. A number of service furlough specials continue to be run each weekend, and the West of England main lines are particularly busy.

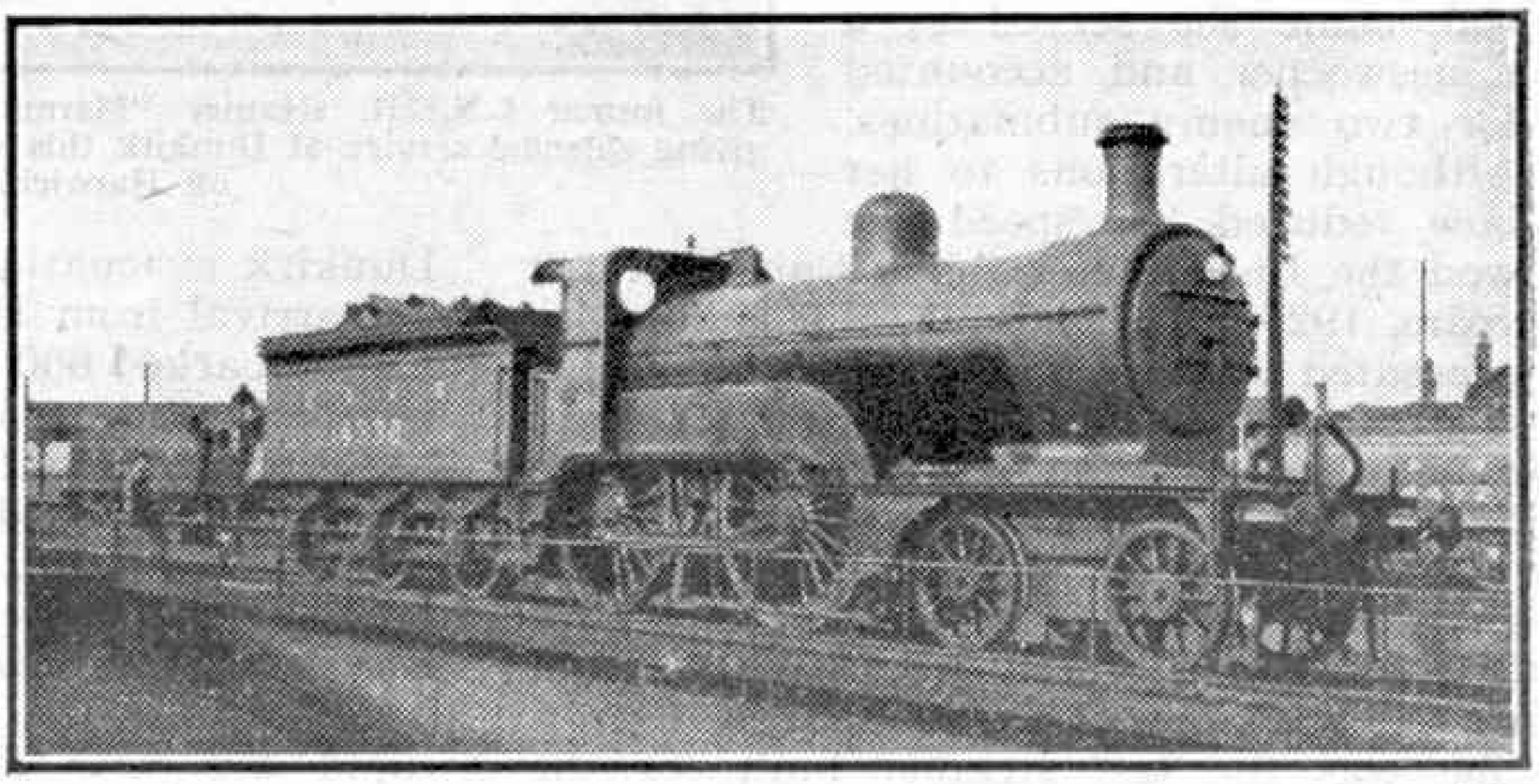
L.N.E.R. Developments

Some very high average speeds, including a maximum of 102 m.p.h. and 100 m.p.h. attained on the level, are reported to have been logged on the occasion of a recent first post-war high speed trial run from London to Edinburgh and back with a six coach train. The engine was "A4" streamlined 4-6-2 No. 2512, "*Silver Fox*," the famous locomotive which reached a maximum speed of 113 m.p.h. in 1936 when working the "*Silver Jubilee*" streamline express from Newcastle to King's Cross. This is the highest speed ever recorded in ordinary passenger service.

The renumbering of "Pacific" and "V2" engines is not quite in accordance with the scheme previously announced; the latest plan now being put into effect provides for "Pacifics" to start at No. 1. The new "A2" 4-6-2 No. 500, is illustrated and described on page 273 of this issue.

The "B1" 4-6-0 locomotive illustrated last month, No. 1040 "*Roedeer*," has been working from Stratford shed and has been joined there by several sister engines numbered 1041 up and unnamed. Many of the original Great Eastern "N7" class 0-6-2Ts, as well as later series of L.N.E.R. build, have been fitted with Doncaster type boilers having round topped instead of Belpaire fire-boxes, as on the 2600–31 batch when first constructed. No. 6636 is another 2-8-0 conversion from "04" to "01."

"Atlantics" condemned last spring were "C1" No. 4457 and "C7" No. 709. Further ex-G.N. 4-4-0s withdrawn were "D1" No. 3053, which had lately been on the M. & G.N. Joint line, and "D2s" Nos. 4330 and 4384, of Grantham and Boston sheds respectively. Another Metropolitan engine scrapped was "H2" 5 ft. 9 in. 4-4-4T No. 6415. "M1" 0-6-4T No. 6148, on the condemned list, was a goods tank engine built in 1904 for the Lancashire, Derbyshire and East Coast Railway, later absorbed in the Great Central. The first of the newest series of Great North of Scotland 4-4-0s to go is "D40" No. 6914; N.B. 4-4-0s on the list are No. 9287 "*Glen Gyle*," of the "D34" class, "D29" No. 9361 "*Vich Ian Vohr*," and "D31s" Nos. 9729 and 2074 (renumbered).



L.N.E.R. "D2" class No. 4338. This former G.N.R. 4-4-0 has now been withdrawn. Photograph by T. G. Hepburn.

Special Trains for American Mails

Between July 1942 and November 1945 the L.M.S. ran 1,606 special trains formed of 17,616 vans conveying mails for American troops stationed in this country or in Europe, as part of their huge war effort. The mail was received, sorted and distributed from a central depot at Sutton Park L.M.S. station.

The L.N.E.R. Clyde Steamer Fleet

By W. A. C. Smith

AT the time of the outbreak of war, in September 1939, the L.N.E.R. fleet of pleasure steamers on the Firth of Clyde consisted of five ships. All of these were paddle driven, to suit the shallow water at Craigendoran, the chief pier at which they berthed. The vessels were the *"Lucy Ashton," "Waverley," "Marmion," "Jeanie Deans"* and *"Talisman."* The *"Lucy Ashton"* is the veteran of the fleet. She was built in 1888 by Messrs. Thomas Seath and Co., Rutherglen. Her length is 190 ft. and a speed of 16 knots is given by the compound engines with which she is fitted. During both World Wars she was left to maintain sailings on the Clyde.

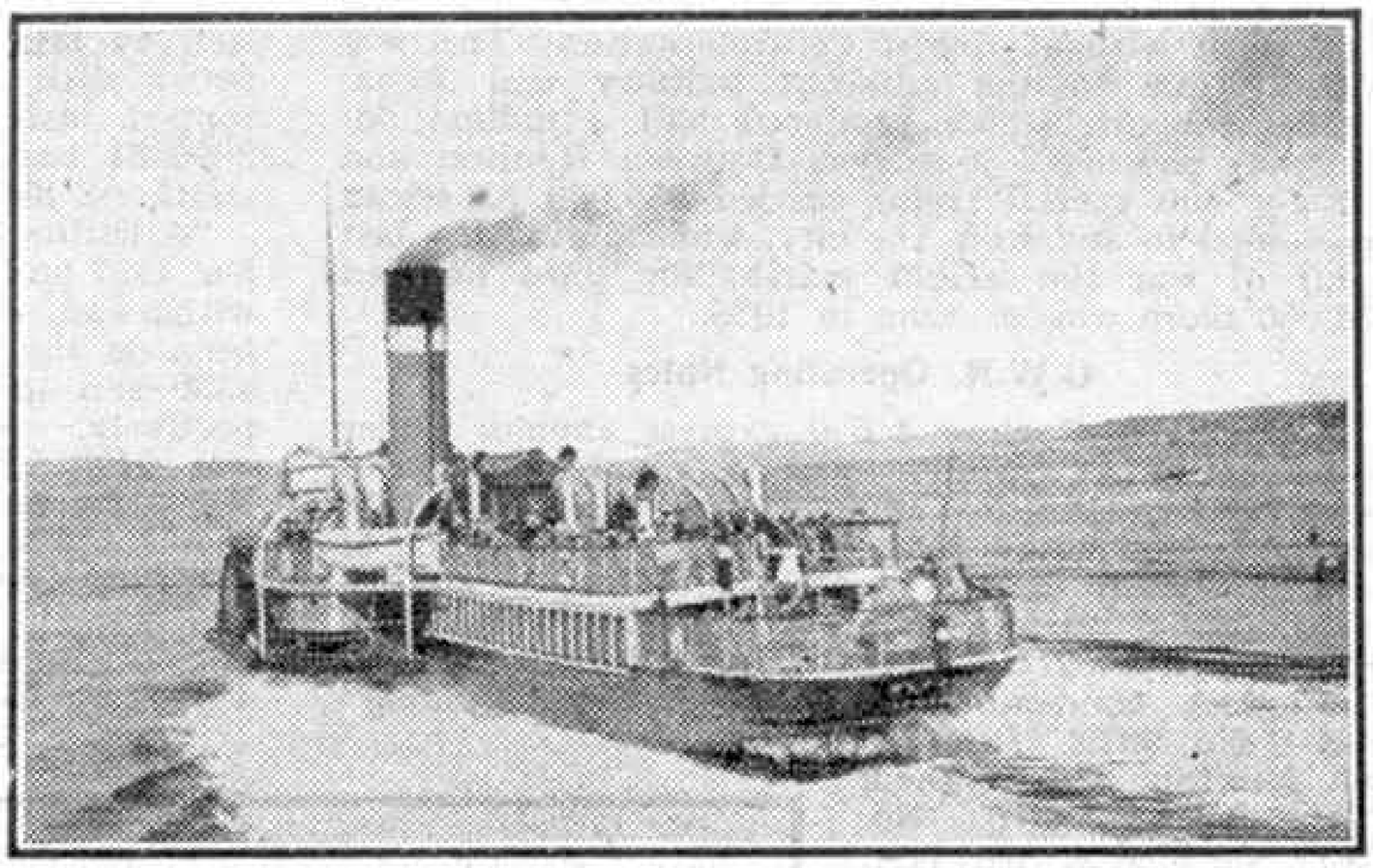
The *"Waverley,"* one of the most popular vessels in the fleet, was built in 1899 by Messrs. A. and J. Inglis, Glasgow. She had a length of 235 ft. and a speed of almost 20 knots. Before the first World War she had many races with rival steamers of the Caledonian and Glasgow and South Western Railways, and on one occasion collided with the G.S.W. *"Neptune."* When war came she served as a minesweeper and accounted for two enemy submarines. Although alterations to her bow reduced her speed she won the Bute Blue Ribbon Cup for three years, 1925, 1926 and 1927. This cup was presented to the Clyde steamer that kept nearest to her timetable during the season, which lasted from 1st June to 18th September.

The *"Marmion"* was built by A. and J. Inglis in 1906. She had a length of 210 ft. and a speed of 17 knots, and served as a minesweeper in the 1914–18 war. She was the last steamer built for the North British Railway. The first built for the London and North Eastern Railwas was the two funnel cruising steamer *"Jeanie Deans."* This vessel, constructed in 1931 by the Fairfield Shipbuilding and Engineering Co. Ltd., is the fastest paddle steamer on the Clyde, her speed being 18½ knots. She has a length of 250 ft.

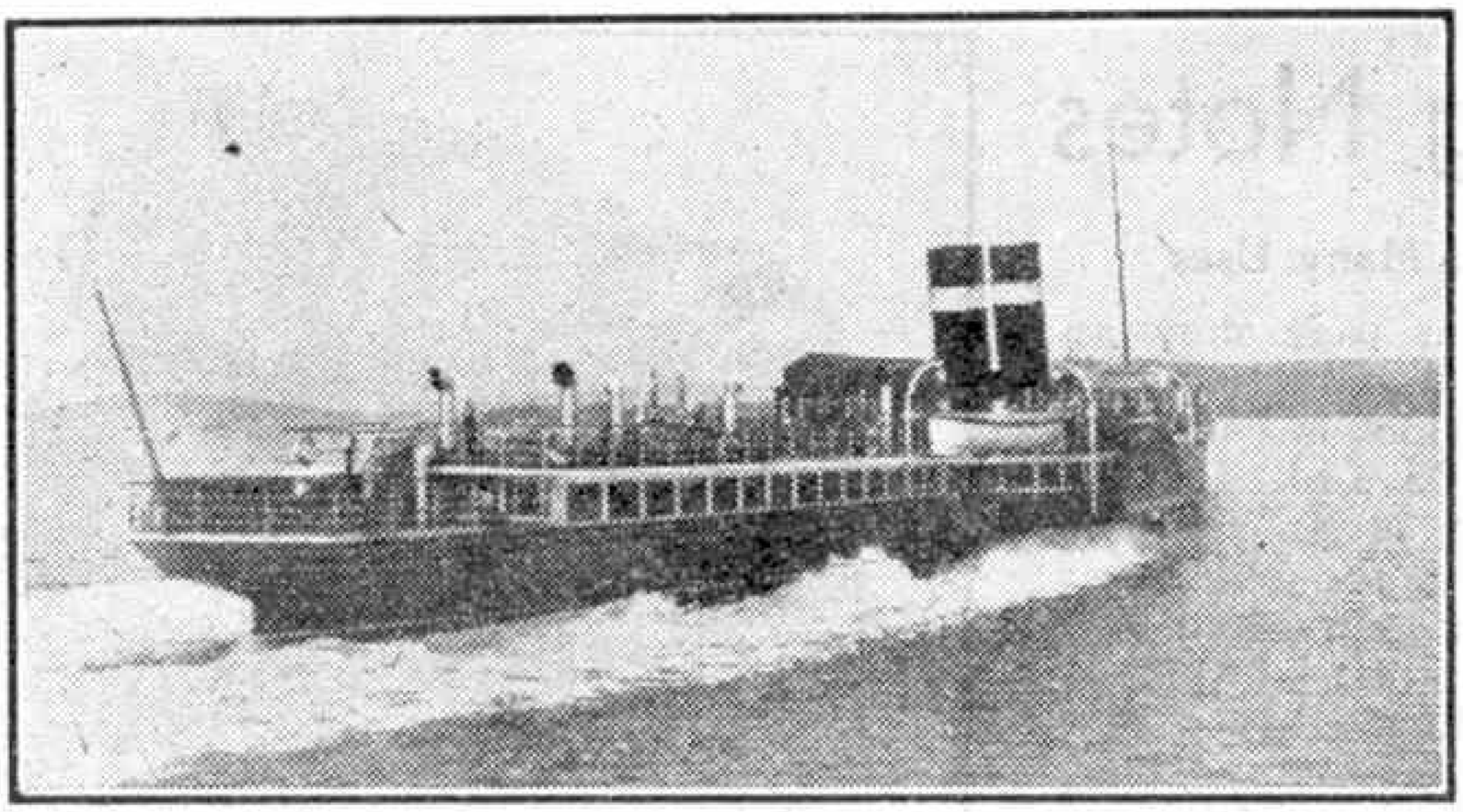
The latest vessel of the fleet is the *"Talisman,"* which was built by A. and J. Inglis in 1935 and engined by the English Electric Co. She has a length of 224 ft. and is an interesting vessel. She was built with diesel-electric engines and was the first real British attempt to bring the paddle ship into line with modern machinery conceptions in regard to low fuel consumption.

After the outbreak of war the *"Waverley," "Marmion," "Jeanie Deans"* and *"Talisman"* were taken over by the Navy. The *"Jeanie Deans"* became part of the 11th Minesweeping Flotilla and the *"Waverley"* and *"Marmion"* part of the 12th Flotilla, which took part in the Dunkirk evacuation. On the first day of her arrival from Harwich the *"Waverley"* had embarked 600 troops when 12 German bombers made a concentrated attack on her from a height of 8,000 ft. For half an hour she evaded the attacks, but finally she was hit on the port quarter by a bomb that passed right through her. The attack continued for another 15 minutes, but the *"Waverley"* kept up a rapid fire with her 12-pdr. and Lewis guns, supplemented by rifle fire from the troops. She was not hit again and there were hopes of saving her, but soon she became unmanageable and would not answer the wheel. Then she sank rapidly stern first, taking 400 of the troops to their death.

The *"Marmion"* made three trips to the beaches, bringing back over 1,000 British and French troops. She survived Dunkirk,



The former L.N.E.R. steamer "Marmion" leaving Dunoon. After giving splendid service at Dunkirk this vessel was bombed and sunk off Harwich.



The "Jeanie Deans," the first vessel built for the L.N.E.R. Clyde service after grouping.

but in 1941 she was bombed and sunk off Harwich. Although salvaged she was later abandoned as a total loss.

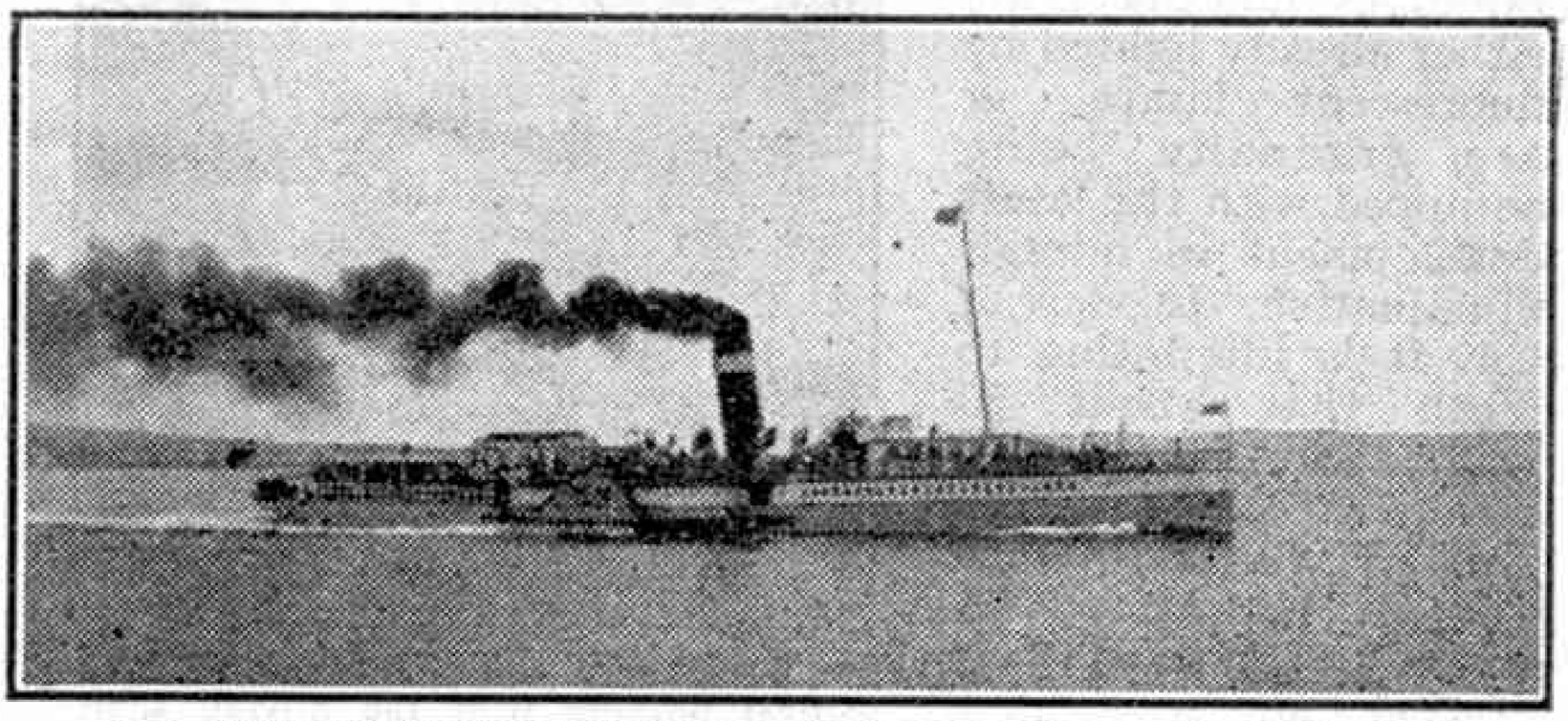
The *"Jeanie Deans"* and *"Talisman"* both survived the war and both have been reconditioned at Glasgow. This summer they will be back on the Clyde carrying holiday crowds.

The reduced L.N.E.R. wartime service on the Clyde was maintained by the 58-year old *"Lucy Ashton."* From 3rd September 1939 to 8th May 1945 she carried 1,128,258 passengers and steamed 143,297 miles. The *"Little Old Lady,"* as she is affectionately known on the Clyde, has lost only five working days due to breakdowns, a truly remarkable record for such a veteran. On 2nd July of last year she resumed the Craigendoran-Dunoon-Rothesay service, which had to be suspended during the war because of the anti-submarine boom across the Clyde between the Cloch Lighthouse and Dunoon. From 11th August, when the resumed L.M.S. service was cancelled for various reasons, until 1st April of this year, she was the only vessel operating from the upper firth to Rothesay. She also had the honour of being the first Clyde steamer to appear with her funnel in peacetime colours after VE day. As the *"Jeanie Deans"* has now resumed her peace-time duties, the *"Lucy Ashton"* will soon be receiving a much needed overhaul and refit.

To replace *"Waverley"* and *"Marmion"* a new steamer is building by A. and J. Inglis. She is to be a paddle vessel capable of carrying 1,350 passengers and with a speed of 17 knots.

Until 1936 L.N.E.R. steamers retained the North British colours, black hull with a white superstructure and a red funnel with a white band and black top. In that year the hulls became grey and this colour scheme was in use until the outbreak of war. There appears to be some doubt as to whether these colours will reappear, as the *"Jeanie Deans"* has appeared with funnels of the usual colour, a black hull with a white upper section, and biscuit coloured superstructure.

It will, unfortunately, be some time before the services reach pre-war level and L.N.E.R. steamers are operating from Craigendoran on the Dunoon-Rothesay-Kyles of Bute and Gareloch services, the Helensburgh and Gourock run, and the Clyde steamer section of the popular "Three Lochs Tour" between Craigendoran and Arrochar. Neither the *"Talisman"* nor the new vessel building will be ready for some considerable time. The former is at present out of the water on a slipway in the yard of A. and J. Inglis, and is stripped of all paint and many fittings. The *"Jeanie Deans"* resumed service on 1st June, after reconditioning by A. and J. Inglis, and this has meant an appreciable improvement in the services from Craigendoran to Gourock, the Holy Loch, Dunoon and Rothesay.



The "Waverley" off Craigendoran. This vessel was sunk at Dunkirk.

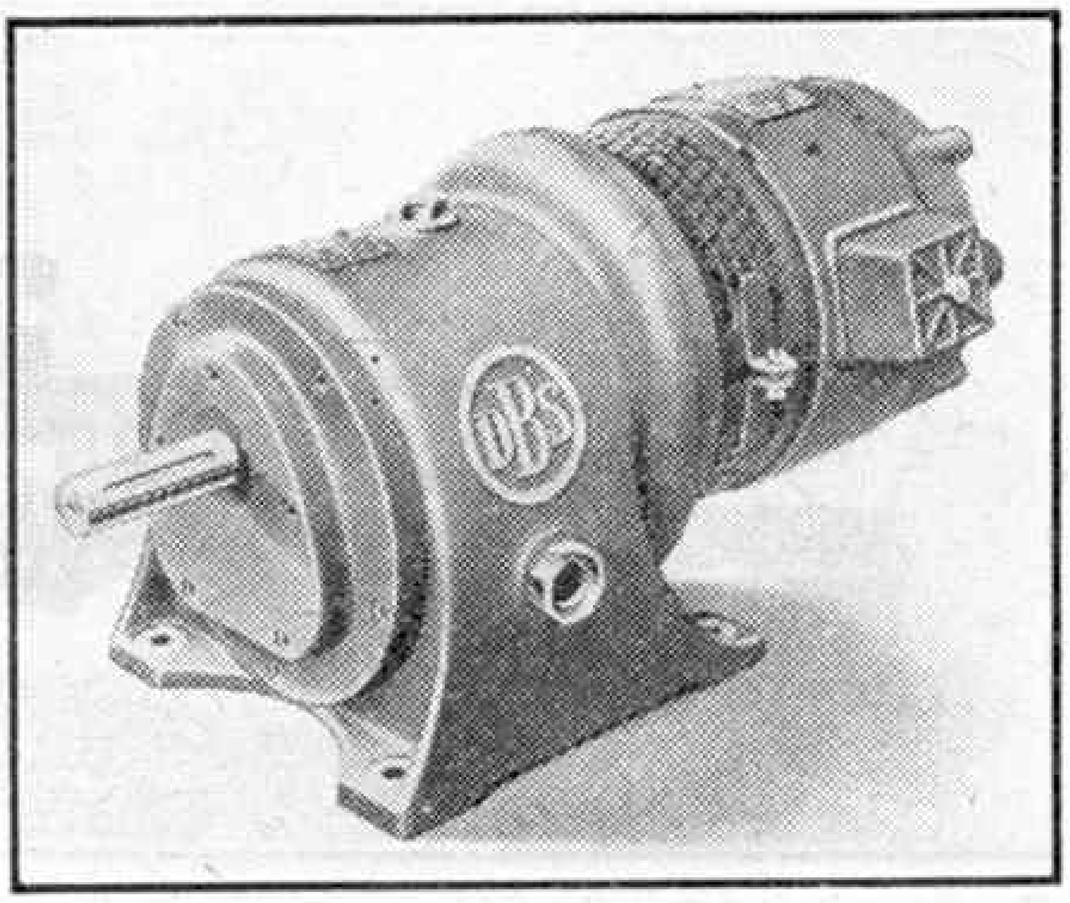
Engineering Notes

A Driving Unit with Many Uses

The illustrations on this page show an interesting motor and gear reduction unit known as the Motogear, which is a product of C. J. Fitzpatrick and Co. Ltd., London N.W.10. The Motogear is a complete unit including a driving motor and either double or triple reduction gears, and it is suitable for a variety of industrial applications such as providing drives for conveyors, small compressors, pumps, fans, textile machinery, etc., where an individual drive is required. The unit is available in a wide range of output speeds ranging from 25 r.p.m. to 345 r.p.m., and its gears, which are of the helical and spur types, are made from high tensile steel accurately generated to give smooth operation and silent running.

A feature of the Motogear is that it can be mounted in a variety of positions according to the particular application for which it is used. In the lower illustration it is shown mounted vertically with the output shaft pointing downward, but it is equally suitable for inverted or horizontal mounting.

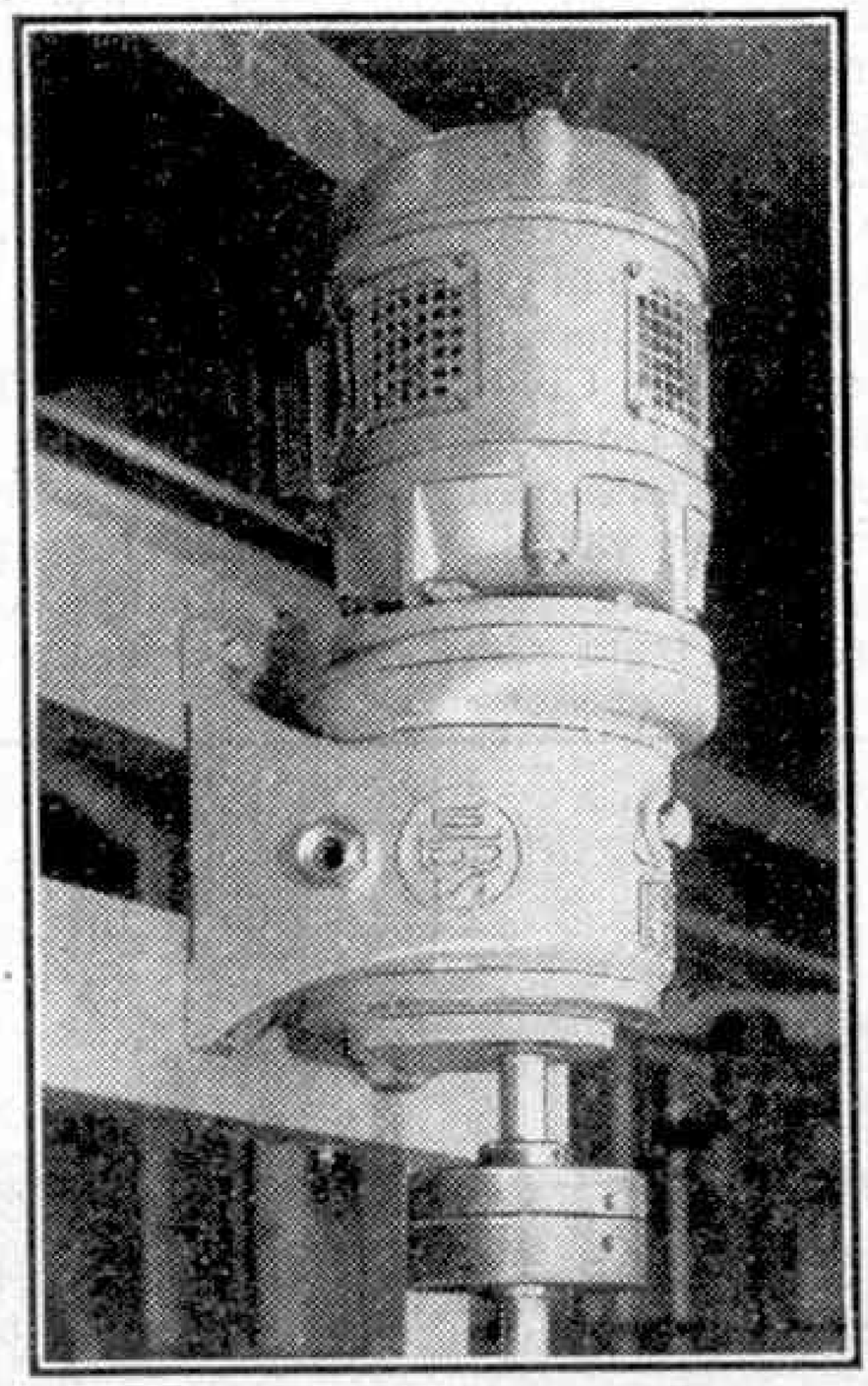
The Motogear is also available as a change speed unit with two output speeds, when used as a double reduction unit. In this arrangement the speed change is effected by means of a sliding lever.



The Motogear unit described on this page. This illustration and the one below are reproduced by courtesy of C. J. Fitzpatrick and Co. Ltd., London N.W.10.

Workshop Lighting Then and Now

Many modern factories and other industrial buildings nowadays are either already lighted by fluorescent lamps, or are gradually being equipped with the latest development in interior illumination. In view of this it is interesting to recall that about 50 years ago many factories, especially in the United States, were lighted by lamps in which a stream of compressed air was used to force oil through a tiny nozzle so that it issued as a fine spray. When ignited the spray produced a brilliant flame about 5 in. or 6 in. in diameter and 30 in. long, which had an intensity of roughly 1,000 candle power.



The Fitzpatrick Motogear mounted in a vertical position with the driving shaft pointing downward.

Facts About London Transport

Among the interesting facts contained in a new series of posters issued by London Transport, which emphasise the devices designed for the safety of passengers on the railways and roads, it is revealed that 5,170 electrically-operated signals are maintained by the Board, and that 844,000 signal movements are made each weekday. The trains have a total of about 20,000 pneumatic doors, which open or close 5,000,000 times a day. London Transport buses run on 68,000 wheels, for which the road service portion requires 48,000 new tyres a year.

The number of tickets issued in one year by automatic machines would extend 131,000 miles if placed end to end. The issue of 2,138,000 season tickets saves 2,400 miles of paper, and roughly 1,160 tons of paper and 8½ tons of ink are used by the Board each year in the printing of tickets.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"BUILDING A GAUGE 0 BASSETT-LOWKE 2-6-0 STEAM LOCOMOTIVE"

(Bassett-Lowke Ltd. 1/-)

Bassett-Lowke Ltd. have long made a special feature of the production of steam models, and indeed the first miniature "live steamers" that would really work and that looked like real locomotives owed their origin in this country to the firm. In this booklet the assembly of a modern 2-6-0 locomotive from the prepared parts of one of their kits is described and illustrated, not in the form of "makers' instructions," but as the work appeared to an amateur builder, a beginner in the hobby.

The term "prepared parts" is used in describing the components of the kit because certain units, such as the underframe and boiler, are complete in themselves. The erector has the fascinating task of fitting the cylinders and steam pipes, making the connections, wheeling the underframe, coupling up the rods and motion and setting the valves, however, and then comes the mounting of the boiler and the cab and various details. This is followed by the assembly of the tender, and cleaning, painting and lining out. When the engine is ready for service the builder is assured that he has as efficient a power unit to work his trains as if he had bought a complete model from the makers.

The various stages in construction are dealt with in turn and at every stage we have the actual experience gained by the novice who writes the story. The time taken is given in a series of simple tables, with the tools required for each stage. Good illustrations are a feature, for in addition to some striking half tones there are several interesting and informative diagrams. An illustration of the completed locomotive also is included.

Altogether the book forms a complete and fascinating exposition of the piston valve type of low-pressure steam locomotive with a plain boiler fired by a spirit lamp. Its appeal is not confined to the beginner; those who are familiar with more advanced types of locomotives will find plenty to interest them in its pages. Copies can be obtained from Bassett-Lowke Ltd., Northampton, price 1/- post free.

"WHAT TO SEE IN ENGINES"

By A. J. Cresswell

(Quadrant Publications. Price 2/6)

Mr. Cresswell truly says in the introduction to this booklet that not all of those who have fallen under the spell of the steam locomotive obtain the full interest that its study can provide. Simply watching trains is sufficient for some, and the collection of engine names and numbers is an engrossing pursuit for others; but even the humblest shunting engine is full of interest for those who know how locomotives are built, how they work and how they have to be handled. To help to provide this knowledge is the aim of this publication.

Locomotive classification by wheel arrangement is first explained. Then follow sections describing visible parts and giving an outline of locomotive operation. These are illustrated by very fully numbered line drawings and sketches. An account is given of various "engine noises," with their explanation, and the operations involved in "Train Working" are well covered. Notes on compound and streamlined locomotives, explanations of the headlamp code, certain locomotive markings and other details, and a list of the locomotive sheds of British railways complete a very useful booklet, which can be obtained from Quadrant Publications, 390, Wakefield Road, Huddersfield, price 2/7 post free.

"L.N.E.R. RENUMBERING OF LOCOMOTIVES 1946"

(Stephenson Society. 1/3)

Full details of the 1946 L.N.E.R. locomotive renumbering scheme are now available in this booklet, due to the enterprise of the Stephenson Locomotive Society. Introductory notes on the original post-grouping renumbering are followed by reference to the partial and indeed uncompleted renumbering scheme of 1942. Then comes a general explanation, with a table, of the present scheme and a detailed list giving old and new numbers.

Copies of the booklet can be obtained from Mr. F. H. Smith, 159, Davidson Road, Croydon, Surrey, price 1/3, post free.

"THE RAILWAYMEN'S YEAR BOOK"

By G. Morris (2/6)

"*The Railwaymen's Year Book*" is primarily a book for railwaymen. It has been compiled to provide a handy reference book for railway employees. Such books are apt to be dull and stodgy, but the illustrated references to many activities associated with the popular interests of railwaymen make this book brighter than most of its type.

After an introduction by Lord Walkden there is information on railway trades unions, associations and organisations, a series of facts and figures concerning British railways and railwaymen, and illustrated sections dealing with crack trains of Great Britain, and railway steamships, docks and harbours. Rates of pay, disciplinary regulations, negotiation machinery and many other items that affect the railwayman and his job are dealt with, and there is a useful list of railway publications.

Holiday information and details of a cash prize competition for reader's suggestions complete this useful book of reference. It is obtainable from the distributors, "*Railwaymen's Year Book*," 5-6, Red Lion Square, London W.C., price 2/9 post free.

"G.W.R. AND S.R. NAMES AND NUMBERS" (2/-); "STOCK CHANGES AND L.N.E.R. NEW NUMBERS" (2/6)

By A. J. Cresswell

(Quadrant Publications)

The first of these booklets is of special interest to the recorder of "names and numbers," for it deals with the engines of both companies in service at the time of going to press. It gives details of over 5,000 engines, and provision is made for easy recording of future changes by the reader. In both G.W.R. and S.R. sections there is an ingenious table by means of which any engine can be referred to its class.

The second booklet has a dual purpose. The first section deals with locomotive stock changes on the L.M.S., G.W.R., and S.R. between January and April. The L.N.E.R. section which follows consists mostly of tables. The first gives the class code of L.N.E.R. locomotives. The second and third provide a key to the L.N.E.R. renumbering scheme now in progress, and others give engine names, classes and sheds.

The two booklets give a large amount of detailed "name and number" information in concise and handy form. They can be obtained from Quadrant Publications, 390, Wakefield Road, Huddersfield, price 2/1 and 2/7 post free respectively.

A Correction: We regret that an error was made in the price of "*British Railways*," by Arthur Elton, in our review of this book in the June "*M.M.*" This should have been 4/6, not 8/6 as stated.

Air News

"Hastings" Transport for R.A.F.

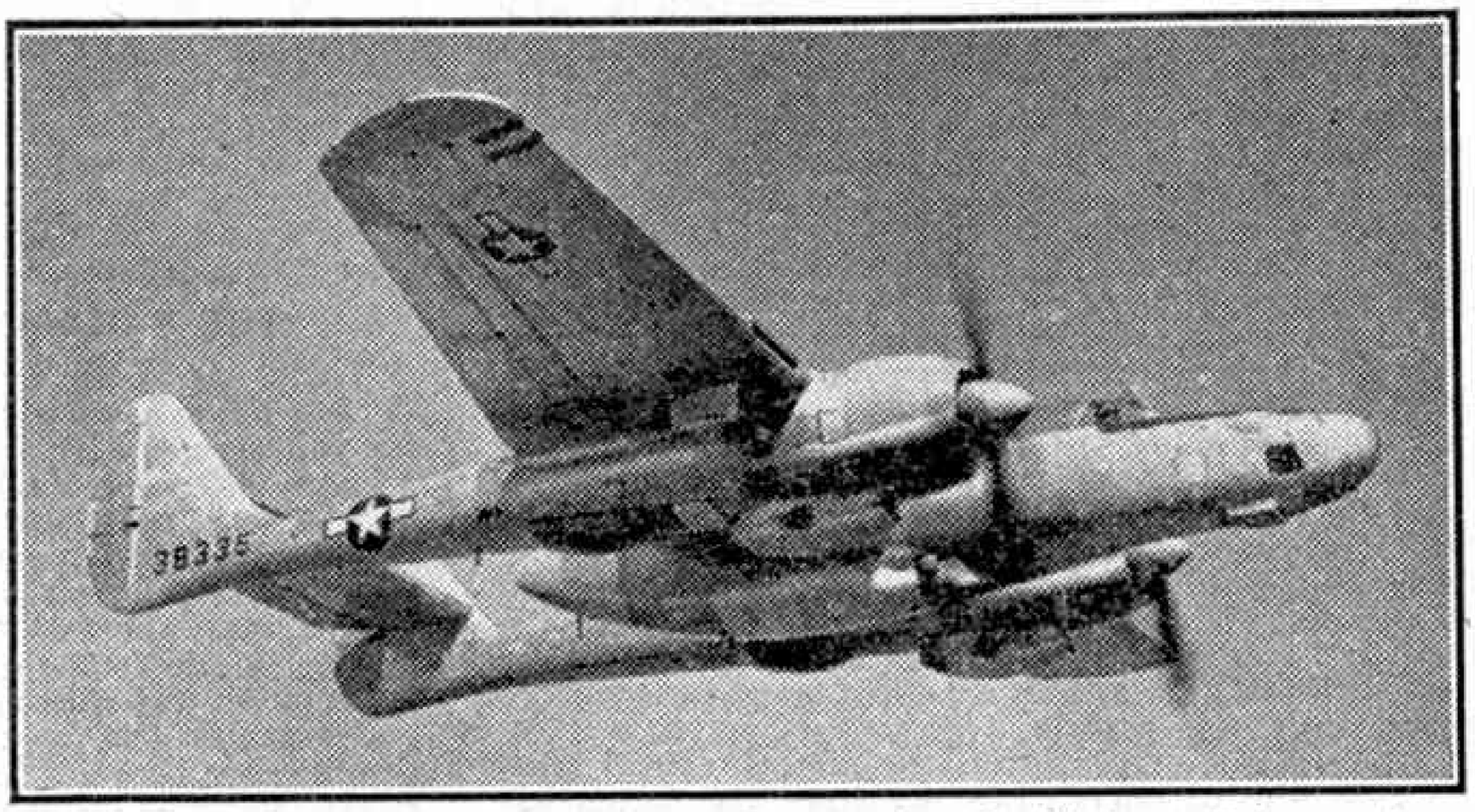
The first flight of the prototype 4-engined Handley-Page "Hastings" military transport took place on 7th May last. The "Hastings" is the largest aircraft ever specifically designed for the Royal Air Force. and can carry a crew of five or six and up to 50 troops. It is a military version of the "Hermes" air liner. The wing span is 113 ft. and length 81 ft. 6 in.

The Northrop "Reporter"

The Northrop Aircraft Company, of California, have been awarded a contract for nearly £2,000,000 worth of their new F-15 "Reporter" photo-reconnaissance aircraft. The upper photograph on this page shows the "Reporter" to be a twin-boomed, twin-engined monoplane, similar in appearance to the well-known "Black Widow" night fighter. It is capable of long-range mapping and reconnaissance tasks previously undertaken by 4-engined "Liberators" and "Superfortresses." There is a crew of two, who sit in tandem under a single large plexiglass cockpit cover, which gives an exceptional all-round field of vision.

Design work on the "Reporter" began in the early Summer of 1944, but several major changes were made on the original model to fit it for the changing requirements of the Pacific War. Like the "Black Widow", it has special Northrop retractable ailerons and full-span flaps which give it a landing speed no greater than that of many small private-owner aircraft. The design caters for the fitting of six cameras in any one of 24 different arrangements, which make possible the use of 11 different types of camera. A particularly good feature is that either member of the crew can pilot the machine or operate the cameras.

The "Reporter" has a wing span of 66 ft. and is 50 ft. 3 in. long. Its two 2,800 h.p. Pratt and Whitney R-2800 C engines give it a top speed of more than 440 m.p.h. at a loaded weight of some 28,000 lb. It has a range of more than 4,000 miles. J.W.R.T.



Northrop F-15 "Reporter" photo-reconnaissance aircraft. Photograph by courtesy of Northrop Aircraft, Inc., U.S.A.

"Dakotas" on British Internal Air Services

The first "Dakotas" made available to Railway Air Services by the Ministry of Civil Aviation were introduced on the company's Glasgow-Belfast and Glasgow-London routes on 20th May last. Three services daily, except on Sundays, are being operated each way between Glasgow and Belfast, and one service between Glasgow and London. The overall time from the centre of Glasgow to the centre of London, or vice-versa, is now reduced to 4 hr. (2¾ hr. flying time). The greater seating capacity of the "Dakotas" enables three times as much traffic as previously to be carried over both these routes.

The introduction of the new machines was accompanied by a substantial reduction in the Glasgow-London air fare. The single fare was cut from £9 to £7, and the return fare from £14.10.0 to £12.10.0.

New British Jet Engine

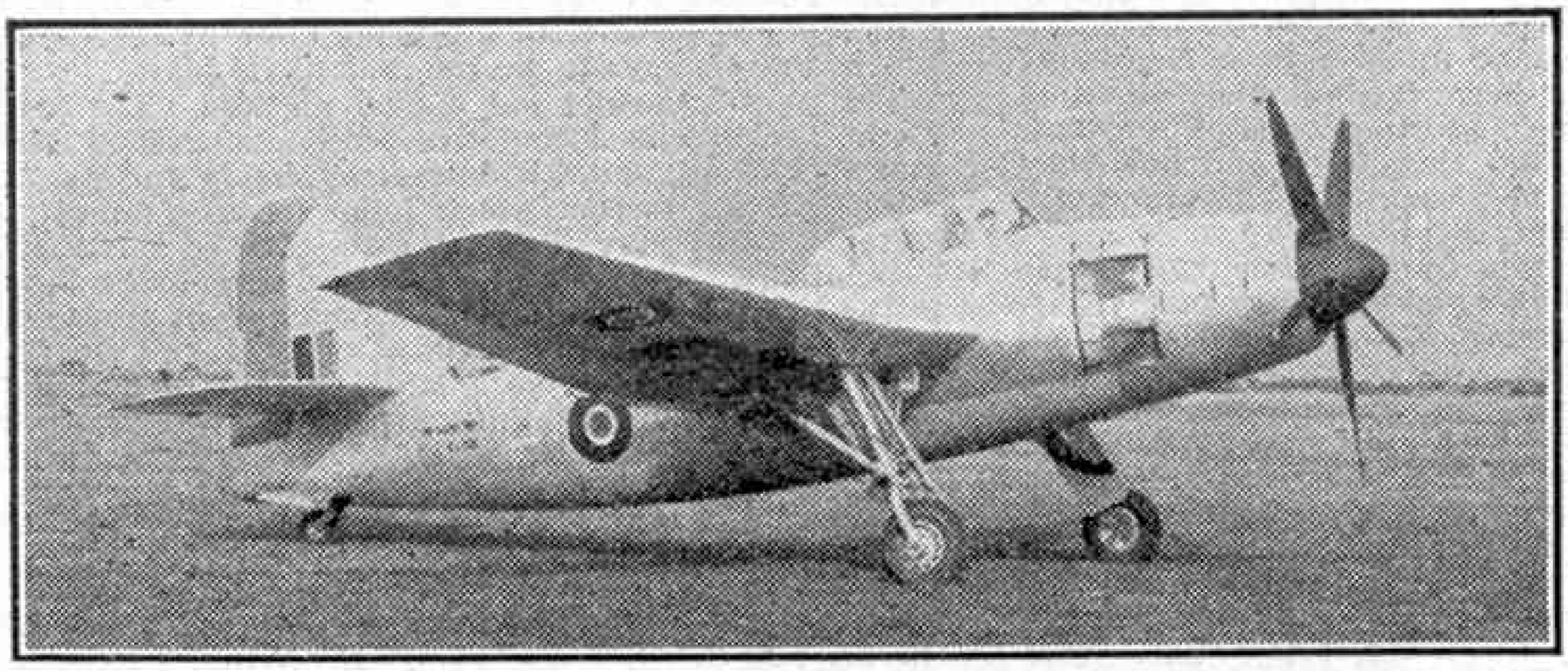
The de Havilland company have announced a successor to their famous "Goblin" jet engine, which powers the "Vampire" single-seat fighter. This is named the "Ghost" and it is already giving 5,000 lb. static thrust, equivalent to 8,000 lb. true thrust horse-power at 600 m.p.h. at sea level, and corresponding to 12,000 h.p. from a propeller-driving engine.

The "Ghost" is similar in general layout to the "Goblin" and is intended mainly for use in single-seat fighters. The de Havilland company point out that although the "Vampire" was expressly designed to take the smaller "Goblin," if a "Ghost" were fitted it would give a higher speed and rate of climb than is possible with any other engine, in addition to a greater mileage per gallon of fuel.

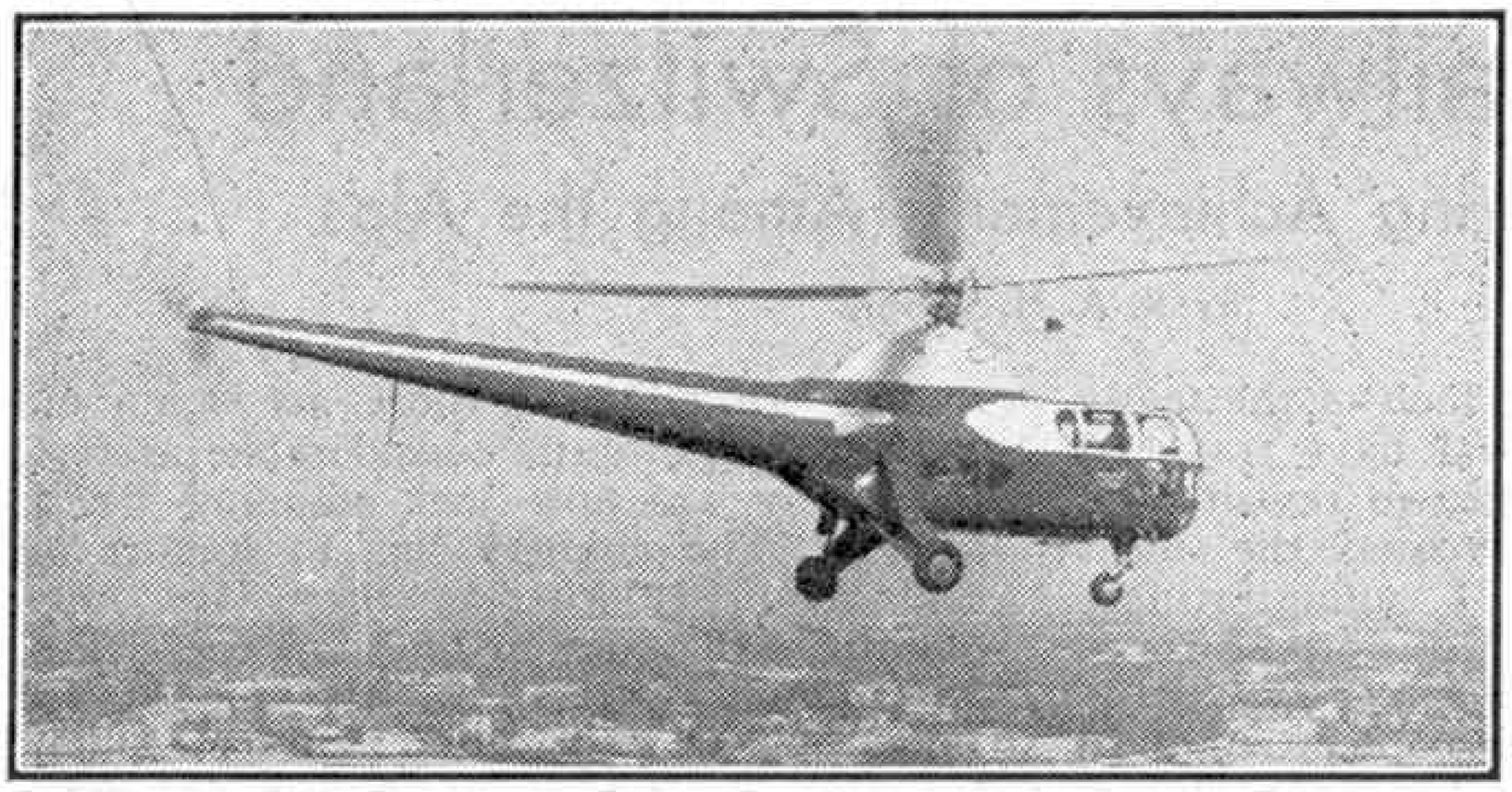
J.W.R.T.

* * *

Avro "Lincoln" B. Mk 30 bombers to the total of 61 are being built by the Beaufort Division, Department of Aircraft Production, Australia, for the Royal Australian Air Force. They will cost about £7,680,000 sterling.



Fairey "Spearfish," the Royal Navy's new and largest torpedo-bomber. (See special article on page 269). Photograph by courtesy of The Fairey Aviation Co. Ltd.



The long tapering fuselage of the Sikorsky S-51 commercial helicopter is well shown in this excellent flying view of the machine.

Sikorsky's First Commercial Helicopter

The first Sikorsky helicopter for commercial use completed its test flights in February of this year. It is the 4-seat Sikorsky S–51 illustrated on this page. The new machine follows the basic design and sturdy construction of the R–5, largest and most powerful of the three Sikorsky production models built in quantity during the war. The Sikorsky R–4B, R–5 and R–6 were the only helicopters used in the war, and between them amassed more than 36,000 hr. flying time in China, Burma, the South Pacific and various sub-Arctic bases.

Deliveries of the S–51 will begin early this Summer, and the versatility of the helicopter is well shown by the variety of jobs on which prospective buyers hope to use it. These tasks include feeder-line air taxi services, airfield to post office and town to town air mail deliveries, oil pipelines survey and maintenance work, crop dusting, forest fire patrol, wire laying, ranch supervision and aerial photography.

The roomy cabin of the S–51 is luxuriously fitted out. A single long seat is provided for three passengers, with plenty of leg room, and a wide, unobstructed view out of both sides and the front of the cabin through plexiglass windows. The machine is powered by a 450 h.p. Pratt and Whitney "Wasp Junior" engine, driving a 3-bladed main rotor of 48 ft. disc dia. The overall length with blades extended is 57 ft. Sea level speed is 103 m.p.h., and the machine has a normal range of 240 miles at 80 m.p.h.

The S–51 has a service ceiling of 13,000 ft. and will climb at the rate of 1,200 ft. per min. at sea level. An interesting comparison is that only four years ago the U.S. altitude record for helicopters was 75 ft, and the longest flight about a mile, set by an early Sikorsky model. Early this year a standard production R–5 set up a world altitude record for helicopters of 21,000 ft., and by averaging 114.6 m.p.h. also set up a new speed record for this type of aircraft. J.W.R.T.

Trial Flight of Bristol "Wayfarer"

Several Bristol "Wayfarer" aircraft are on order for Channel Islands Airways Ltd., and it is expected that the first of these 36-passenger air liners will be ready for service early this month. The prototype machine made a trial flight to the islands and back on 9th May last. It was piloted by Mr. A. J. Pegg, test pilot of the Bristol Aeroplane Co. Ltd., and took off from Filton, Bristol. After calling at Southampton the machine was flown to Guernsey and later to Jersey, and on each island it was inspected by the Lieut.-Governor, Bailiff and other officials.

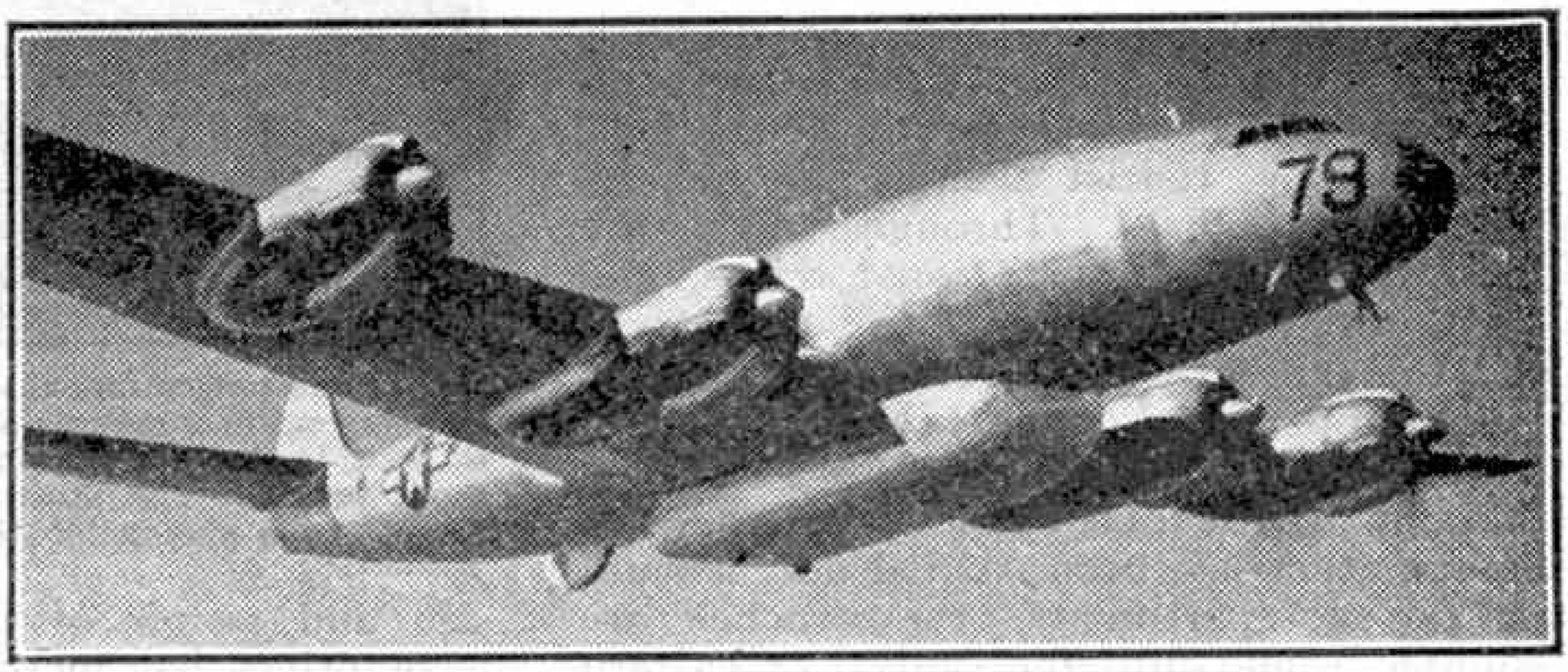
Passengers were carried on both the outward and return trips. The flight back to the mainland was over the regular Jersey-Croydon air route, and the "Wayfarer" covered the 177 miles in 1 hr. 15 min.

Bigger Loads for the "Constellation"

The lower photograph on this page shows a Lockheed "Constellation" transport with the new "Speedpak" external carrier attached to the underside of the mid-fuselage. This streamlined metal carrier is 33 ft. long, 7 ft. wide and 3 ft. deep, and is of 395 cu. ft. capacity, thus almost doubling the "Constellation's" original baggage capacity of 450 cu. ft. The carrier is fitted with partially-recessed wheels to facilitate handling on the ground, and a built-in electric hoist that quickly raises it into position to be locked to the fuselage enables it to be attached to the aircraft in 2 min. The use of the "Speedpak" reduces the top cruising speed by only 10 m.p.h.

More News of the Bristol 167

Because of the problem of providing runways long enough for the Bristol 167 "Brabazon" I air liner there was a possibility early this year that the design might have to be shelved, even though construction was well under way. These fears have been set at rest by the Government decision to authorise the construction of four of these 8-engined 110-ton aircraft. The first "Brabazon" I will have eight Bristol "Centaurus" engines buried in its wing and driving four contra-rotating propellers, and should be flying by April next year. Subsequent machines will have gas-turbine engines and should be in service on the B.O.A. transatlantic service in 1949. They will carry 180 day or 80 "sleeper" passengers at a cruising speed of 350 m.p.h. J.W.R.T.



When fitted with a "Speedpak" external carrier under the centre of the fuselage, as shown here, the "Constellation" transport can carry almost double its original load. Photograph by courtesy of the Lockheed Aircraft Corporation, U.S.A.

The Railways of Switzerland

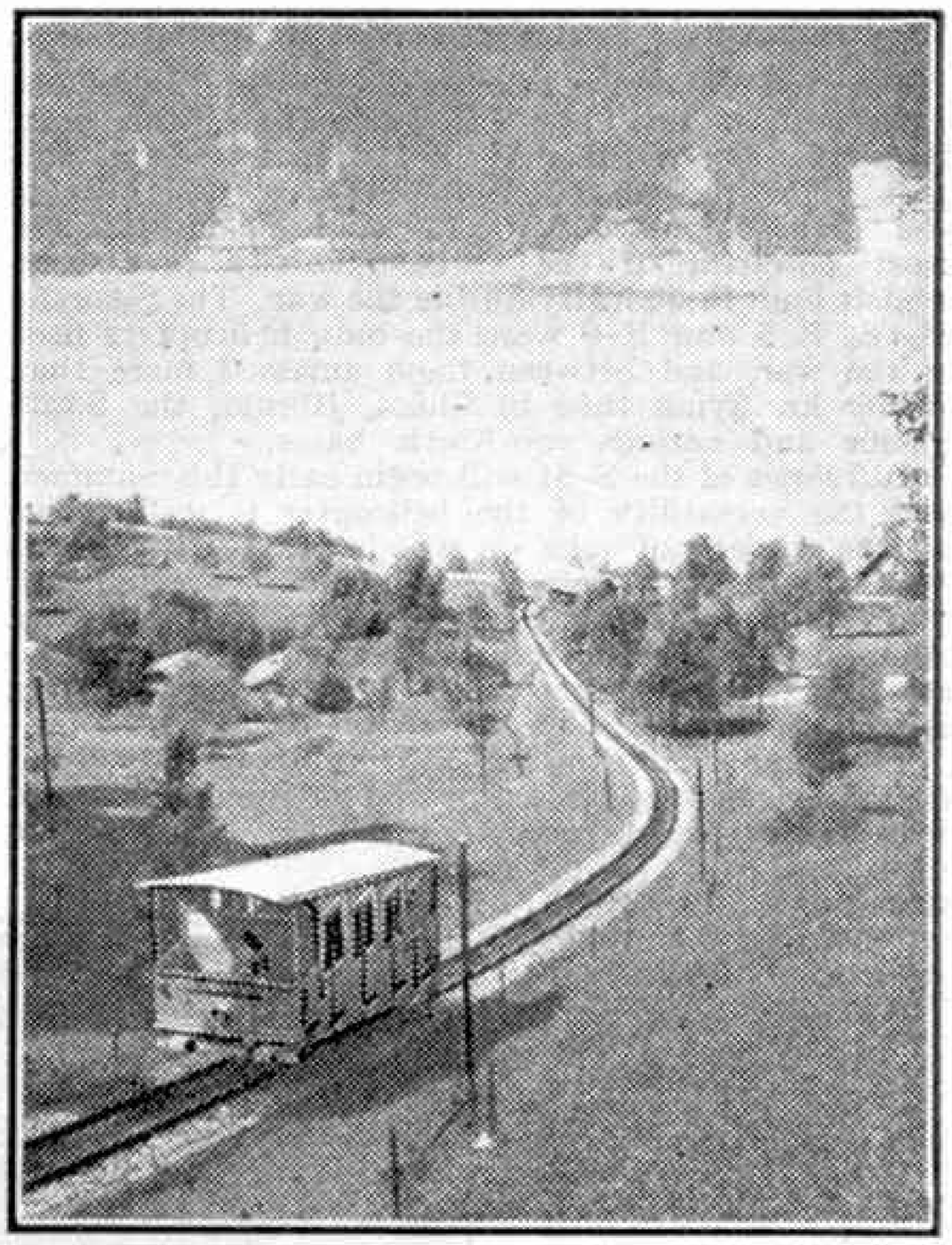
Engineering Achievements Among the Alps

By R. A. H. Weight

WHEN I am asked which of the many countries in which I have travelled I have the greatest desire to revisit, and which on the whole created the most favourable impression, I unhesitatingly answer "Switzerland." In normal times the Swiss tourist and catering industry is of the greatest importance on account of the superb opportunities for mountaineering, ski-ing, skating, boating and holiday-making generally that the country provides, and Switzerland also has large towns and manufactures. Together these have brought into existence a very fascinating railway system of the highest engineering interest.

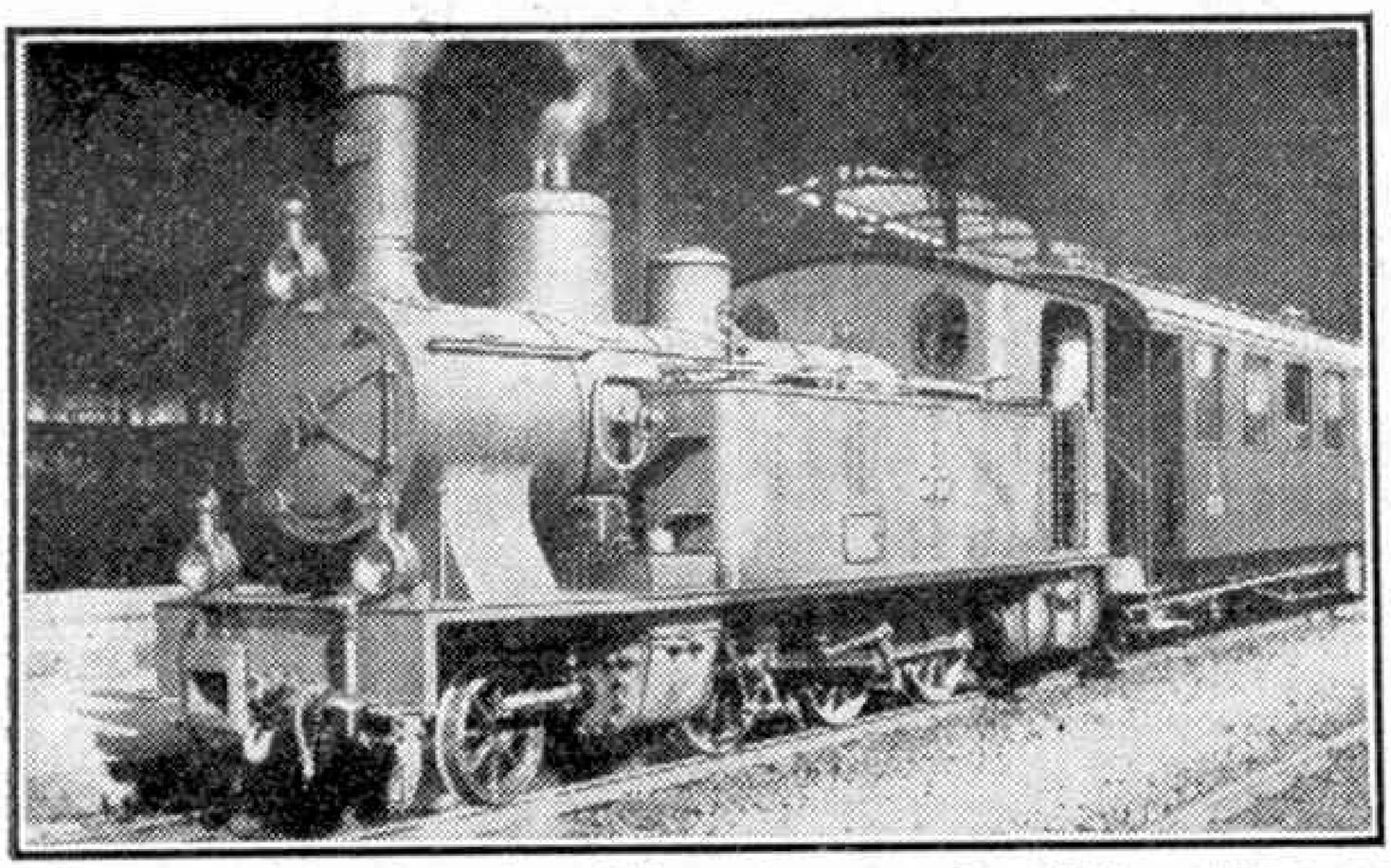
In my article *"A Railway Enthusiast Abroad"* in the December 1945 *"M.M."* I described a journey from Paris to Basel, in Switzerland, by the express conveying through carriages to Austria and Roumania. We will now assume that we are starting our exploration at this important town, which is on the Rhine, as many visitors do. We had left Alsace, now again French territory, just before running into the great station of Basel, which though Swiss is international in character, with terminal sections for French, German and Swiss trains. These have barriers, customs houses and passport controls between them, and there is also an extensive general circulating area, with an excellent restaurant, also shops, and booking, tourist agents' and money-exchanging offices. Through tracks are used by certain international trains, and there are also avoiding lines for goods; but the general procedure is illustrated by what happens to French through carriages. These run into the western terminal section. After customs and passport examination has been carried out, usually in the compartments, the coaches are shunted round into the central or eastern station for attachment to the Swiss express.

The main Swiss railways are operated by the State, almost entirely by electric traction on the 15,000-V alternating current overhead system. The supersession of steam has been a gradual process continued until quite recently, but 2–10–0, 4–6–0, 2–6–2T, 0–8–0T and 0–6–0T steam locomotives may still be seen in yards or depots, shunting, and on a few running routes. In addition there are some old engine types of quite considerable interest, but many are now just standing by in reserve. The country has to import all coal required, whereas there are huge quantities of water in the numerous lakes, or running down from the mountains, which modern engineering skill has utilised for the generation of power in great hydro-electric plants. Concurrently the size and power of the separate electric locomotives has increased enormously.



One of the longer funicular railways, showing a car climbing up to a mountain viewpoint. Lake Lucerne is seen in the background with the mountainous shore beyond. The illustrations to this article are from photographs by C. R. L. Coles.

Apart from the use of Italian in parts of its southern territory, Switzerland is officially a bi-lingual country, using German and French; hence the lettering on the rolling stock and the notices "S.B.B." and "C.F.F.," standing for *"Schweizerischen Bundesbahnen"* and *"Chemin de Fer Federale"* respectively. Swiss coaching stock is almost entirely of the vestibuled bogie type, with centre or side corridors.

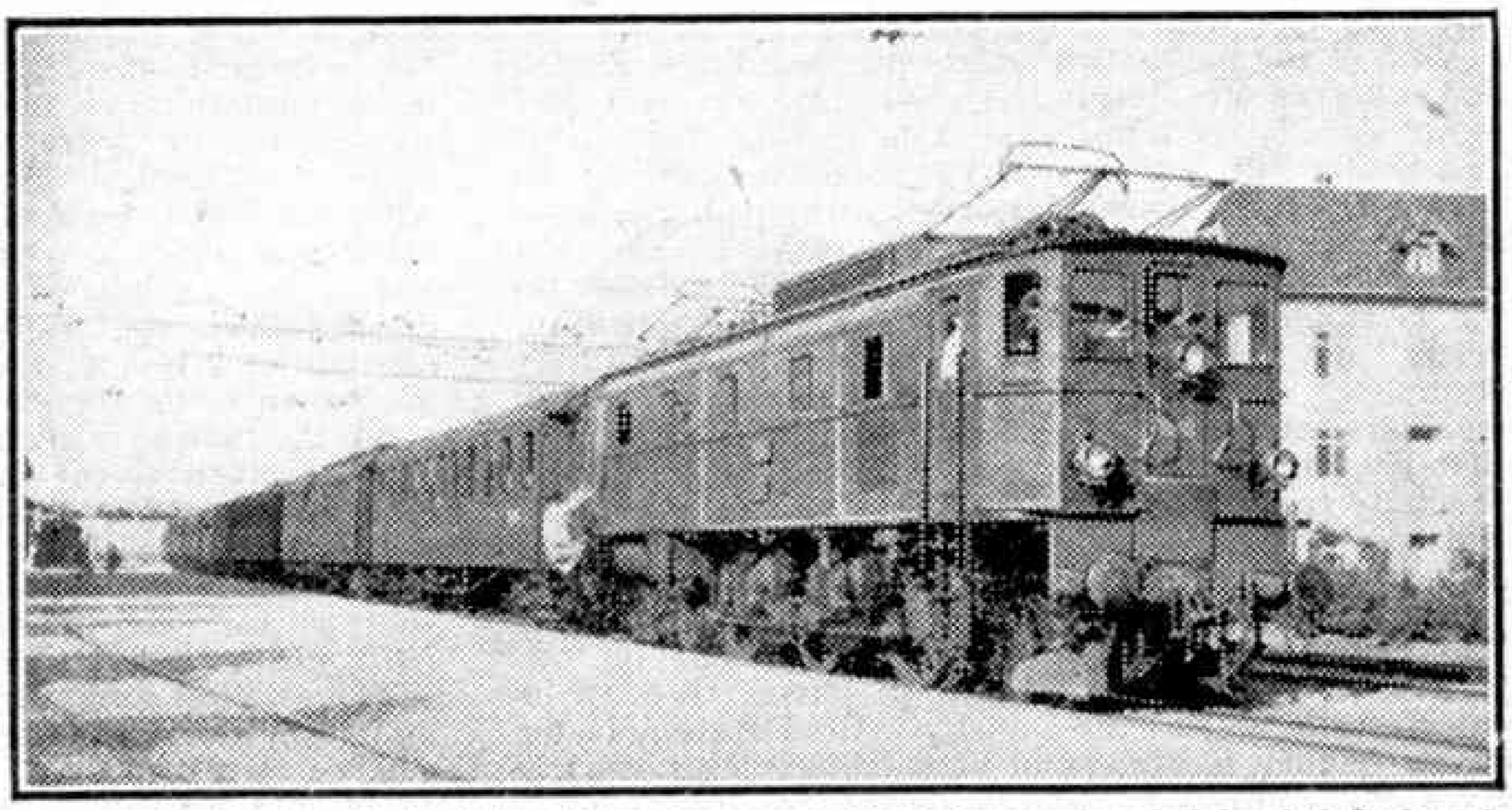


No. 202, a 2-6-0 tank engine of the metre gauge Brunig line at Lucerne. This photograph was taken before electrification.

As a rule it is painted dark green and is smart and clean. Electric locomotives are painted dark red, and steam ones black. Swiss stock normally works in its own country only, but the through trains may include in their formation brown sleeping or restaurant cars of the International Sleeping Car Company, as well as ordinary corridor vehicles or vans belonging to many of the principal countries of Europe employing the 4 ft. 8½ in. gauge. Swiss locomotive power is invariably employed.

One of the boldest and most famous main routes is the St. Gotthard from Lucerne to Chiasso on the Italian frontier, 32 miles from Milan. This connects France and Germany with Italy, and carries a heavy through passenger and freight traffic as well as serving many delightful mountain or lake resorts of Switzerland. It winds and climbs up to a maximum altitude of 3,786 ft. above sea level, which is more than 200 ft. higher than the top of Snowdon, the loftiest mountain in England or Wales. The summit level is at the centre of the 9¼-mile St. Gotthard tunnel. In one 18-mile length the line rises 2,000 ft. at a continuous average of 1 in 48. The steepest gradients are about 1 in 37-38, the same as the famous Lickey Incline on the L.M.S., but there are many miles of them. In order not to involve more severe climbing than that, there are three sections where the line traverses two or three loop tunnels or "spirals," doubling back on its tracks and emerging at a higher level amid wild Alpine scenery.

Electrification was completed in 1920. Since then traffic has increased enormously. When I first saw the line, round about 1930, the heaviest freight trains from the north conveying coal to Italy weighed 1,378 tons. This was a terrific load for such gradients, requiring three 2–6–6–2 electric locomotives to haul it over the worst climbs. Such engines are rated to haul about 420 tons at 22 m.p.h. up a gradient of 1 in 38½. The most powerful Swiss Federal passenger locomotives of the "Ae 4/7" type, built in 1927–34 with a 4–8–2 wheel arrangement, frequently have to work in pairs on the heaviest expresses. Single-handed they can average over 30 m.p.h. with up to 400 tons, or attain nearly 40 m.p.h. with 300 tons, on these gruelling ascents; but a power unit was desired that could average 35–40 m.p.h. to St. Gotthard summit with passenger loads up to 600 tons. This was achieved in 1932 by the two giant "Ae 8/14s," which are really two locomotives in each case, permanently coupled together and driven from either end, needing only one driver and mate. The wheel arrangement is 2–4–2–4–2, 2–4–2–4–2. The driving wheel diameter is 5 ft. 3 in. on No. 11801, but is 4 ft. 5 in.



One of the lighter St. Gotthard line expresses at Brunnen, headed by 4-6-2 electric locomotive No. 10402.

on No. 11851 and also on the later example, No. 11852, built in 1939 with a rated horse power of 12,000, the highest in Europe so far as is known. The overall length of this engine is 111½ ft. and its total weight about 244 tons, of which no less than 160 is available for adhesion. The maximum speed is about 62 m.p.h. Powerful regenerative and air brakes are provided, as on all modern Swiss main line locomotives.

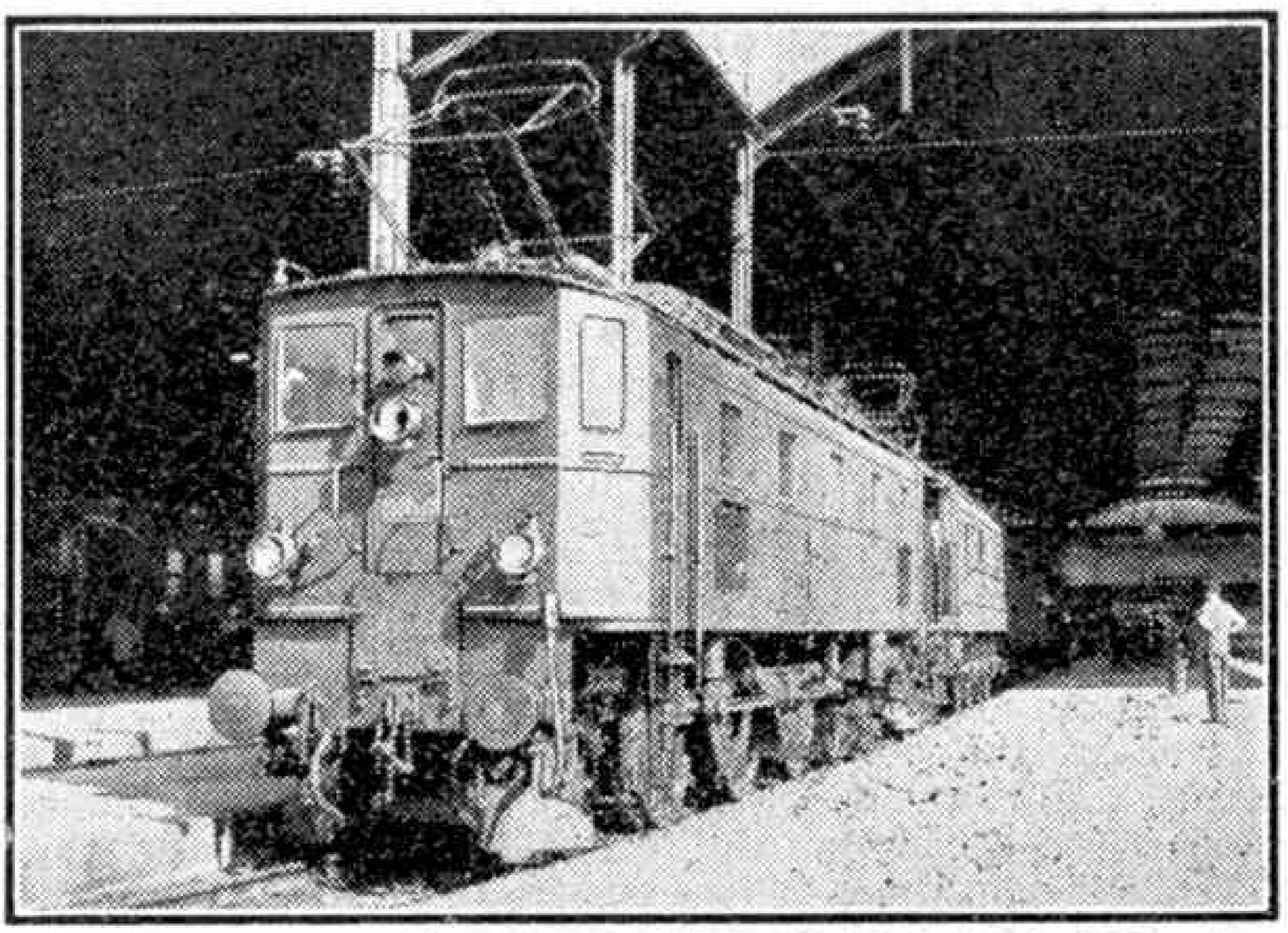
On a typically fine run the heaviest ordinary express from the Italian frontier, booked to cover the 88¼ miles from Bellinzona to Arth-Goldau non-stop in 136 min., at an average of 38 m.p.h. over the St. Gotthard, regained 11 min. on the through run to Lucerne with a train weighing over 580 tons. No. 11851 climbed long stretches of 1 in 38–40 steadily at 38–40 m.p.h. The make-up included "*Mitropa*" sleeping cars; a Swiss postal van and dining car; and Dutch, Italian, German, Belgian and French corridor coaches, with a rather incongruous-looking little boiler van on the front. Boiler vans are necessary during winter on international trains in Switzerland to warm the coaches of other countries fitted for steam heating only. The attendant stokes a boiler in the wagon as the train goes along, often amid frost and snow, in order to supply steam to the train heating pipes. Swiss passenger stock is efficiently heated electrically, but their electric locomotives cannot provide steam!

On the Basel-Zurich-Chur main line in the lowlands, which actually are well over 1,000 ft. above sea level, there are some nasty gradients. Typically fine work was the acceleration to 42 m.p.h. up 4½ miles continuously at 1 in 83 from Brug with 450 tons by a 4–8–2 electric locomotive. To my knowledge there is no equal in Europe to this outstanding uphill Swiss performance. The speeds on such runs average 45–55 m.p.h. with a usual maximum of about 58. With specially adapted locomotives geared for speeds up to the seventies, and five new lightweight coaches, certain expresses on fairly level routes, such as over the 37 miles between Lausanne and Geneva, were timed up to 60 m.p.h. in 1937–9. These notes are based on prewar time tables and experiences. Sets of two and three coaches, brightly painted red or blue and fitted with motors and driving compartments at each end, have proved popular recently for fast inter-town services; there are also new single passenger or parcels cars complete with driving unit.

Most of the main stations are fine buildings. Zurich and Lucerne are termini necessitating reversal and some double running on rather congested lines. Practically all stations have clear indications to passengers, and open platforms without barriers—a boon to railway enthusiasts! Tickets are examined and collected on the trains. Signalling is modelled on the German style, and white as a light indicating "clear" has been changed to green. Upper quadrant semaphore stop signals are seen, as well as disc repeaters showing two lights side by side. Colour light signalling is being extended. There is a good deal of single track, but fast trains are worked smoothly and safely without train staff or ticket by means of Siemens and Halske's lock and block system, with interlocking and electrical control of train acceptance. The bell attached to a control instrument on the platforms rings loudly as a train passes through or enters stations, and the smartly attired stationmaster or his deputy is always in attendance. This worthy gives the right-away to the driver by means of a sort of miniature disc signal at the end of a metal stick, which he carries like a wand of office.

In Eastern Switzerland the extensive privately owned metre gauge Rhaetian Railway by dint of lighter construction penetrates to altitudes unattainable by the full scale lines, serving the lovely mountain and winter sports resorts of Davos, Pontresina and St. Moritz, which lie in elevated valleys a mile or more above the sea. Loads are limited to four or five corridor cars or their equivalent. Electric locomotives haul the trains over single track with passing places; gradients are as steep as 1 in 29; and tunnels, curves and bridges abound. There is a marvellous seven-arch viaduct 221 yds. long on the Davos-Filisur section that is 288 ft. above the tumbling river Landwasser. This is the highest bridge I have ever seen or travelled over.

Going up to St. Moritz there is most spectacular travel amid magnificent scenery. In 3½ miles the line ascends 1,330 ft., with vast double loops, spiral tunnels, cuttings, precipitous ledges and snow fences. In the single-line Albula tunnel, 3¾ miles long, a summit 5,981 ft. above sea level is passed. The associated metre gauge electric Bernina Railway



The Berne express at Lucerne, with 4-6-2 and 4-8-2 electric locomotives at its head.

winds its way from Pontresina to Tirano in Italy, reaching an even greater altitude amid high mountains, glaciers and passes.

Small restaurant and kitchen cars were enterprisingly provided on certain trains operating the narrow gauge mountain lines, of which there are several other important examples serving many of the elevated resorts, and providing comfortable accommodation, at any rate for first or second class passengers. For instance, the Furka-Oberalp Railway cuts right through the heart of the Alps, connecting with the Swiss Federal main line at Brigue, on another international route that traverses the Simplon, 12¼ miles, the longest tunnel in the world. The line crosses over the St. Gotthard at the tremendous altitude of 7,100 ft., and joins the Rhaetian Railway at Dissentis in the Grisons. It affords one of the most fascinating railway trips in Europe. A bridge on the way over the Steffenbach gorge is dismantled each autumn to avoid damage by winter avalanches, and is rebuilt within a day or so when the line reopens in the following June. Ordinary adhesion as well as rack-and-pinion propulsion is in operation with steam tank locomotives.

There were rack-and-pinion narrow gauge steam mountain railways with gradients of 1 in 4 or even steeper, worked like that up Snowdon in Wales. Increasing use is now being made of electric traction for such lines, for example those up the Rigi or Pilatus, two lofty peaks (*Continued on page 304*)

Guy "Vixen" lorries of the Croydon Borough Council that run on methane produced from sewage.

Motor Lorry Fleet Driven by Gas

Methane from Sewage used at Croydon

IN an interesting and highly successful experiment carried out during the war years by Croydon Borough Council a large fleet of motor vehicles has been operated on methane gas produced from sewage as fuel. This scheme now effects a saving of 85,000 gallons of petrol a year.

Methane, also called marsh gas, is colourless, odourless and inflammable, and is formed at the Croydon Sewage Works by the bacterial destruction of sewage sludge. The average composition of the gas as produced is 70 per cent. methane and 30 per cent. carbon dioxide, but after washing the final product contains 90 per cent. methane and has a calorific value of approximately 900 British thermal units per cubic foot. In this form it is supplied to the engine. The gas is compressed into 12 storage cylinders, at a pressure of 5,000 lb. per sq. in. These cylinders are connected to a charging control panel, from which the vehicles receive the gas through a flexible pressure hose. It is interesting to note that the charging of the vehicles occupies about the same time as for petrol.

The vehicles that have been adapted for running on methane are Guy "Vixen" 4-ton tippers. These are fitted with four small high-pressure storage cylinders, mounted vertically in pairs at the rear of the cab and secured in a cradle slung under the chassis frame and held by U bolts. The pressure in the cylinders is 3,000 lb. per sq. in. and four contain 1,700 cu. ft. of gas, which is equivalent to about 10 gallons of petrol.

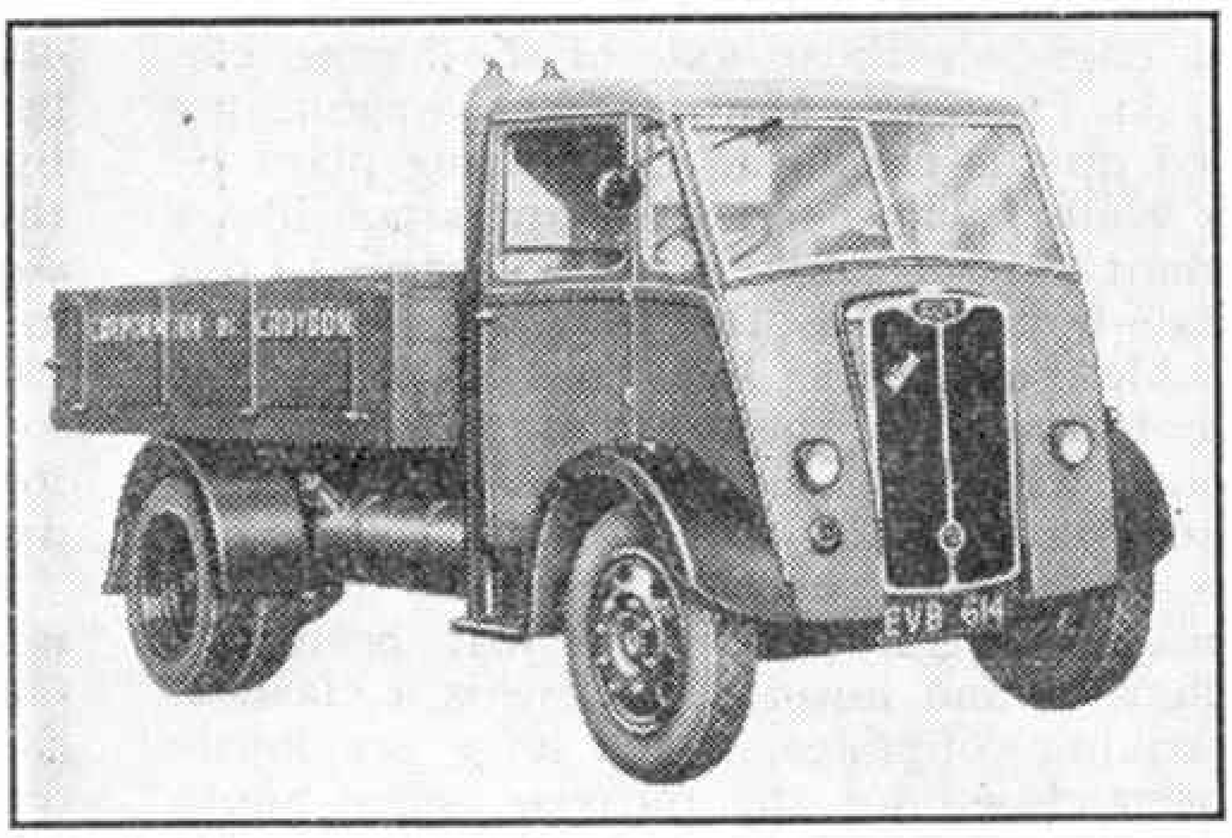
The gas passes from the cylinders to a first stage reducing valve located under the passenger seat, which brings the pressure down to 10 lb. per sq. in. It is further reduced in a second stage reducing valve mounted on the top of the engine cover at the rear. The gas is supplied from the second reducing valve to the engine through a floating piston mixing valve, indirectly controlled by the ordinary throttle butterfly in a standard carburetter. The piston mixing valve is directly actuated by the reduction of pressure in the induction manifold. It allows the correct quantity of methane to be drawn into the engine, according to its throttle position, and it also admits the correct amount of air to mix with the gas to form an efficient explosive charge. The gas then passes through a large bore pipe coupled directly to the air intake of the Zenith type carburetter fitted as standard to the Guy "Vixen." It is interesting to note that no alteration of jet or choke settings is necessary, and furthermore it takes only a few seconds to switch over from gas to petrol operation if required.

Starting the engine in normal cold weather presents no difficulty, but in very low temperature conditions a primer is brought into operation. This consists of a valve that allows a small quantity of gas to be introduced into the induction elbow above the butterfly; this is turned off by a small handwheel as soon as the engine fires.

As methane is a dry gas and produces a higher exhaust temperature than petrol, it was considered desirable to introduce a form of upper cylinder lubricant. A bottle mounted on the rear dash of the cab contains a graphited light oil which is drawn through a restrictor into the induction elbow, the amount drawn through depending upon the degree of reduction of pressure in the manifold.

The overhead valve Guy engine is particularly suited to methane operation and the only alteration from standard settings adopted by the manufacturers was to advance the ignition timing by approximately 15 deg. to ensure thorough combustion of the mixture, for methane is somewhat slower in burning than a normal petrol air mixture.

The venture is an unqualified success. The Corporation's fleet of over 60 vehicles has now run well over 1,000,000 miles, and a considerable amount of interesting information has been gathered. It has been found that engine wear and tear is considerably reduced. Running is smooth and there is a complete absence of "knock" or "pinking."



The high-pressure storage cylinders for methane can be seen behind the cab of this Guy "Vixen." The illustrations to this article are reproduced by courtesy of Guy Motors Ltd.

Ship Coaling in South Africa

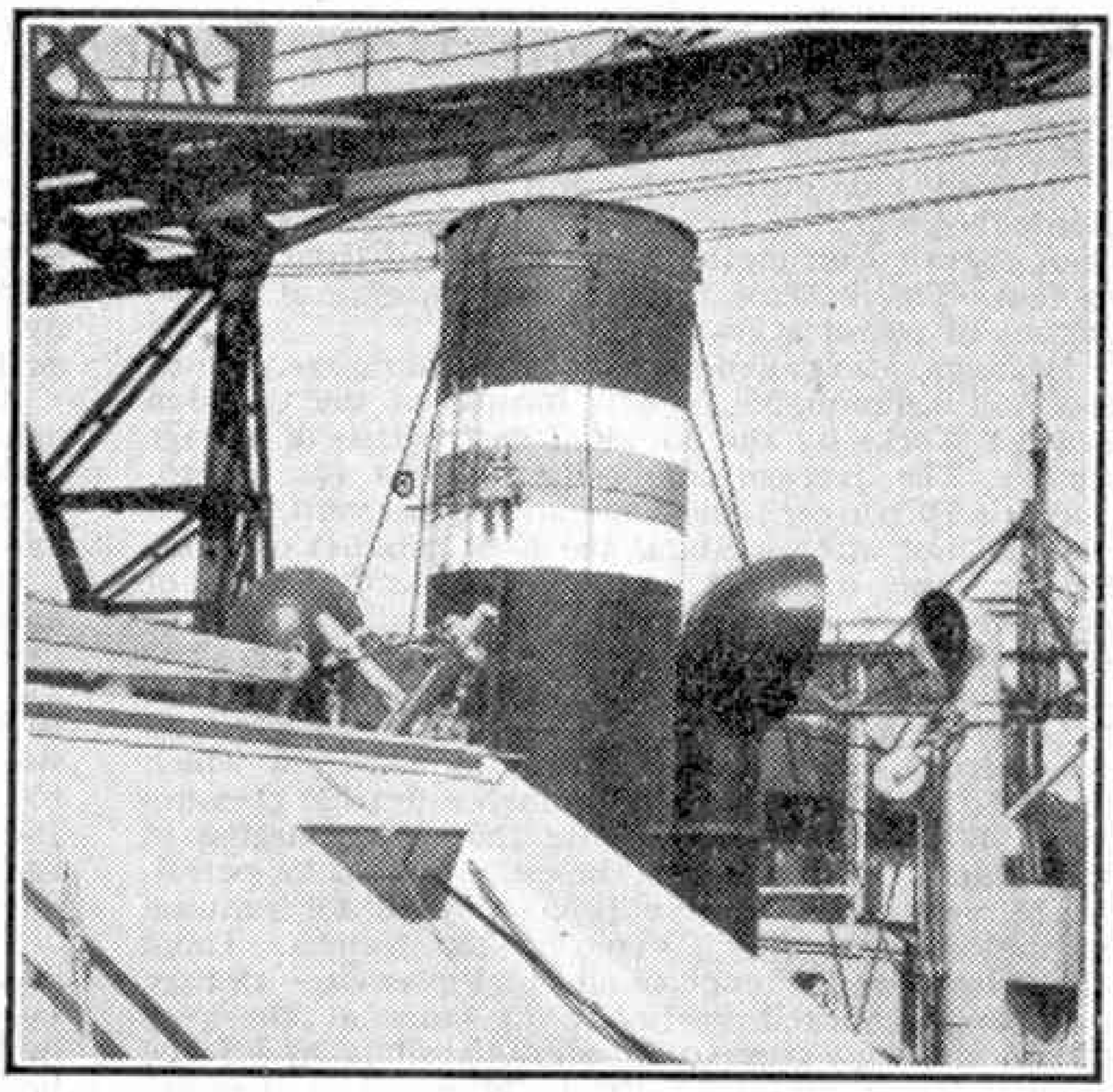
By S. G. Hobson

FROM Durban, and also from the Portuguese East African town of Lourenço Marques, huge quantities of coal are exported weekly in vessels that are loaded in record time by mammoth ship coalers. The height of the massive tower of one of these machines is nearly 100 ft., and the elevator lifts the coal in the 50-ton cars of the South African Railways, which are painted red and carry interesting capacity marks, often written in Afrikaans. For instance, one sees "Tarra" or "Tare," with "Vrag" or "Load," these amounts being expressed in pounds. Usually they have Westinghouse brakes, and they have the word "Kool," meaning "Air," below the letters "S.A.S.," the initials of Suid Afrikaans Stoeltrek.

At Durban the trains are hauled to the Bluff coaling stages, which are usually clouded by a fog of black coal-dust, behind 2–8–2 or "Mikado" freight engines which are among the largest and best-looking to run on any line of less than the standard 4 ft. 8½ in. gauge. They are of British appearance, except for the massive pilot or "cowcatcher," electric searchlight and sanding gear. One unusual feature is that they are unpainted, boiler and cab being left in a dull gun-metal finish, which looks very well so long as it is kept clean. Each car when detached from the train is propelled into the elevator hoist by an ingenious "traveller," which bobs out of a slot between the rails like a rabbit from its burrow, to engage with an axle of the loaded car.

At Lourenço Marques, the wagons are led up the incline to the coaling plant by a Kaffir, who carries an appliance like a giant pair of tongs. He hooks this to one axle-box, clamps the jaws to an endless cable beside the line, and signs to the motorman in the adjoining cabin; the oiled wire sings and quivers as it tautens under the strain, and then the car begins to glide slowly up the incline, to meet the empty wagon which has just been discharged and lowered. There is a clash of striking couplings, which have previously been closed for the purpose, since South African rolling stock couples together automatically on impact if the jaws are left open. The empty car rolls out of the cage and down an incline, which returns it to the sidings, while the laden one takes its place. The locomotives here are nearly all German-built 0–10–0 tanks by Henschel and Sohn of Cassel, with a few older ones of the 0–6–4 type.

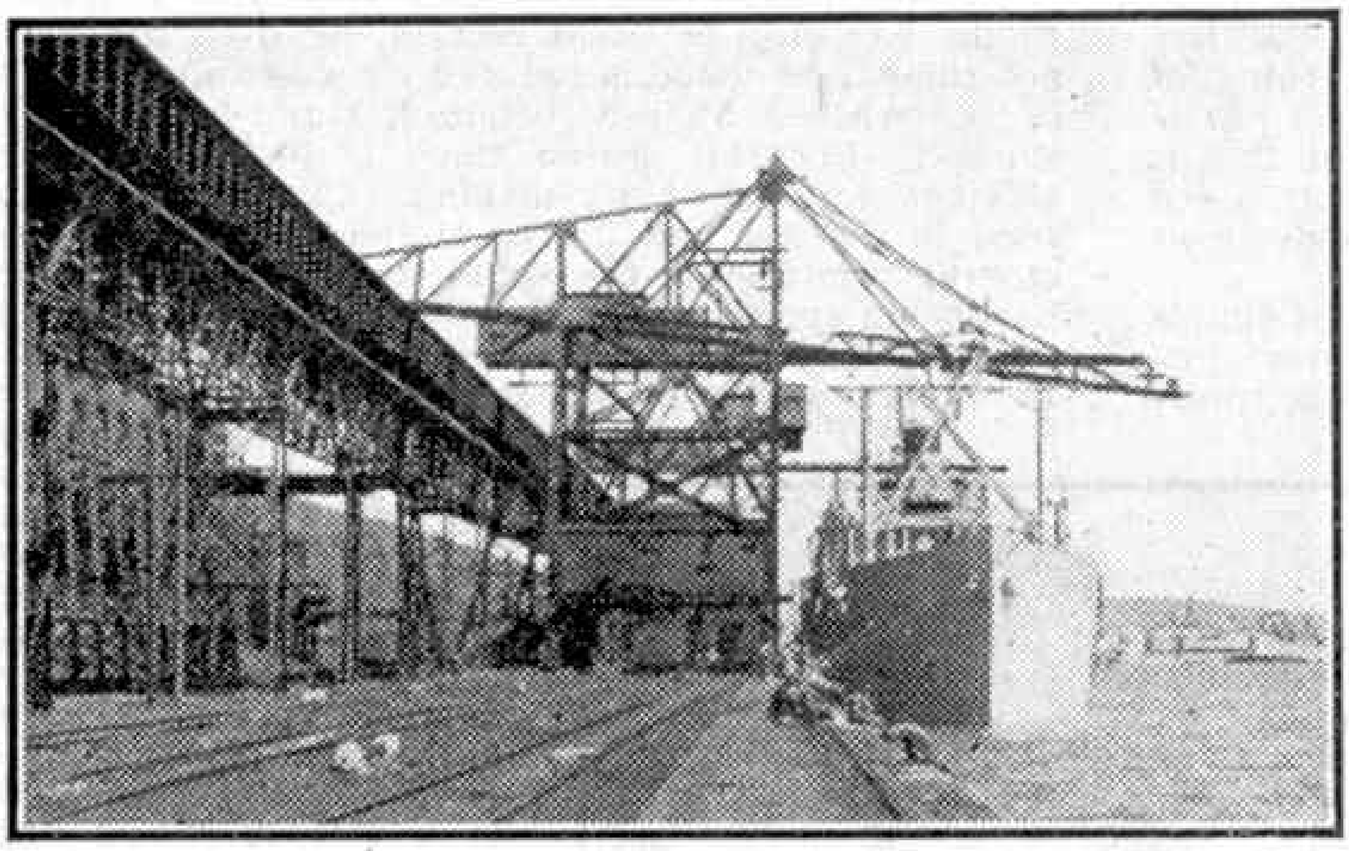
As soon as the ship is alongside, and even before all the mooring ropes are ashore, the coal supervisor and his men are aboard, chanting their endless refrain "Time is money," and demanding to see the first mate. As that long-suffering officer has first to attend to the moorings in the bows of the ship, and is then waylaid by the Customs, the Health Authorities, the Agents and the Police, all wanting to see somebody or something, it is with mixed feelings that he finds the coaling-plant crew grouped around his cabin door for a heart-to-heart talk. There is nothing for it but to invite them in, however, and discuss the plan of campaign.



High-speed coaling plant at Durban in readiness to start work. The illustrations to this article are from photographs by N. Bennett, Durban.

Meanwhile, we can spend another minute in considering the whole situation. Our ship has probably discharged her last cargo at some wharf far up the Red Sea or the Persian Gulf, where the local amenities consisted of a native village and three sorrowful palm trees. We were three weeks getting there, a fortnight

discharging the cargo with native pick-and-shovel labour, and three more weeks on the return voyage. That has meant at least two months away from civilisation; nothing in comparison with what some men have to endure, but still, quite long



A Durban scene, with the coaling plant delivering coal to a ship berthed.

enough in the cramped space of a cargo ship; and here we are in the heart of a fine modern city. All the men aboard are hoping for a few pleasant evenings ashore, and the question is, will they be able to fit their programme into the time available? The giant ship coaler very soon answers that for them.

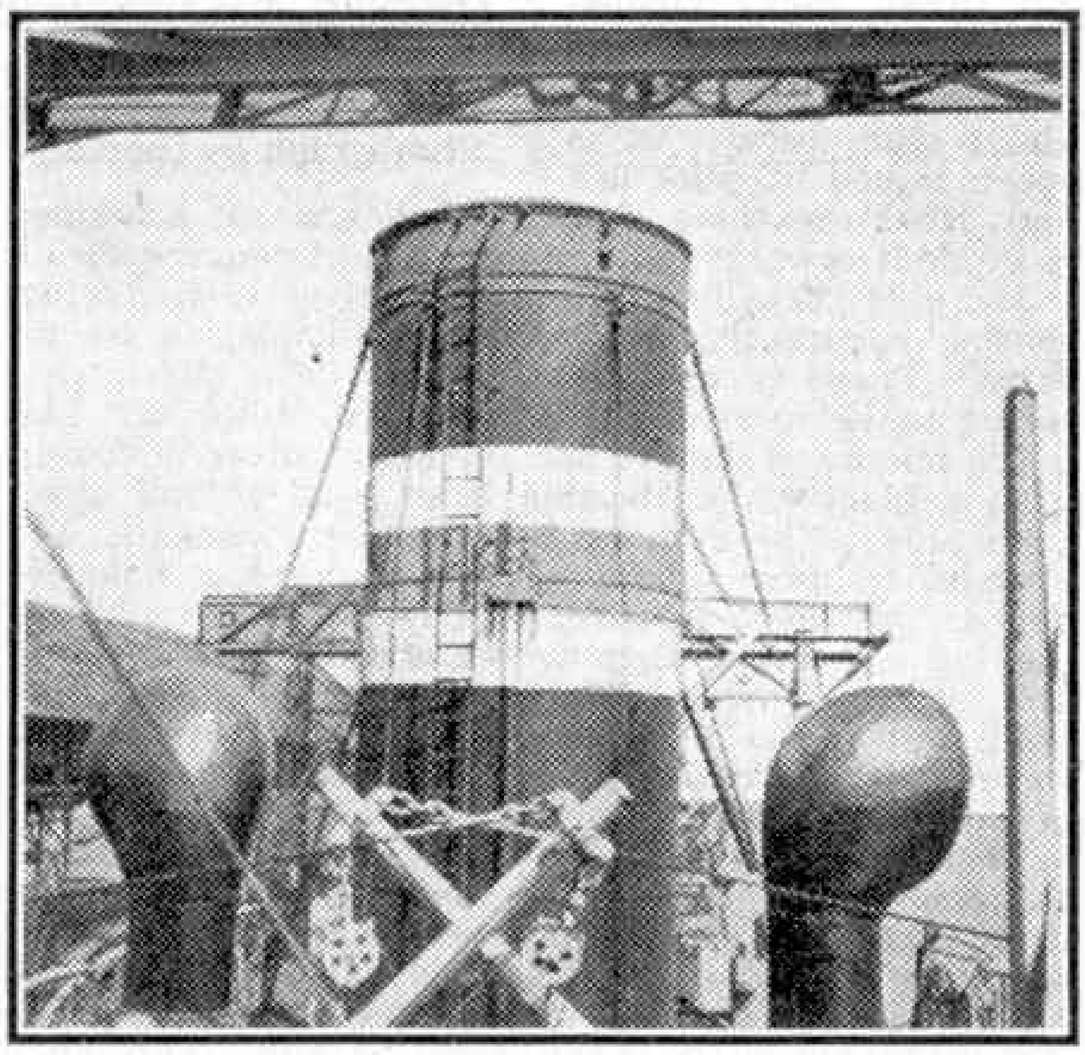
The coaling plant at Durban has a total output of 1,000 tons per hour, spread over five ships at a time. The Lourenço Marques machines can load a ship, trim her, and get her away to sea with 7,000 tons of coal, cargo and bunkers, in a day and a night; I have seen this done more than once. Most of the South African coaling plants work night and day. During that time the second and third mates will have to relieve one another in shifts, watching the cargo, and each will have half the crew working under him to shift moorings, and to carry out routine work.

The coaling machines at Durban are on rails and move themselves along the length of the ship, saving much trouble to the crew. At Lourenço Marques the hoist is fixed, so the vessel herself has to be constantly shifted by means of an ingenious device called the "shore back-spring." A heavy steel wire runs from the bows of the vessel to a pulley on the quay some distance ahead, then back to the hoisting shed, where it runs round the barrel of an electric winch, out again to another pulley a long way astern of the ship, and finally to the after deck. To shift the vessel and so bring another hatch under the chute, the motorman heaves her along the wharf with his electric winch until the foreman blows a whistle as a signal that she is in the right position. There are other ropes securing the ship as well, often two or three at each end, and these have to be slacked off or hauled in.

Trimming gives us a little respite. It is not long before the coaling machine has poured in such a quantity of cargo that it has heaped itself up at one or more of the hatches in a huge mound nearly as high as the bridge, which, by the way, is usually protected a little by old tarpaulins.

One would think that so great a mass could never be stowed inside the ship, but it disappears like magic. Kaffirs with flickering lamps go down the holds through the "trimming-hatches," which are small manholes in the 'tween deck spaces, and then literally dig themselves out into the daylight again, filling up the corners and levelling off the coal as they go. Some ships are easier to trim than others, and specially-built colliers need little trimming at all; but in any case it is an unenviable job.

Finally the coal foreman comes in with his papers. He is now so black that he can hardly be told apart from his Kaffir labourers. Coal dust is inches deep everywhere, in the soup, in the cabins and on the deck. But once at sea we shall be soon washed clean and squared up.



The elevators spotted over the bunkers.

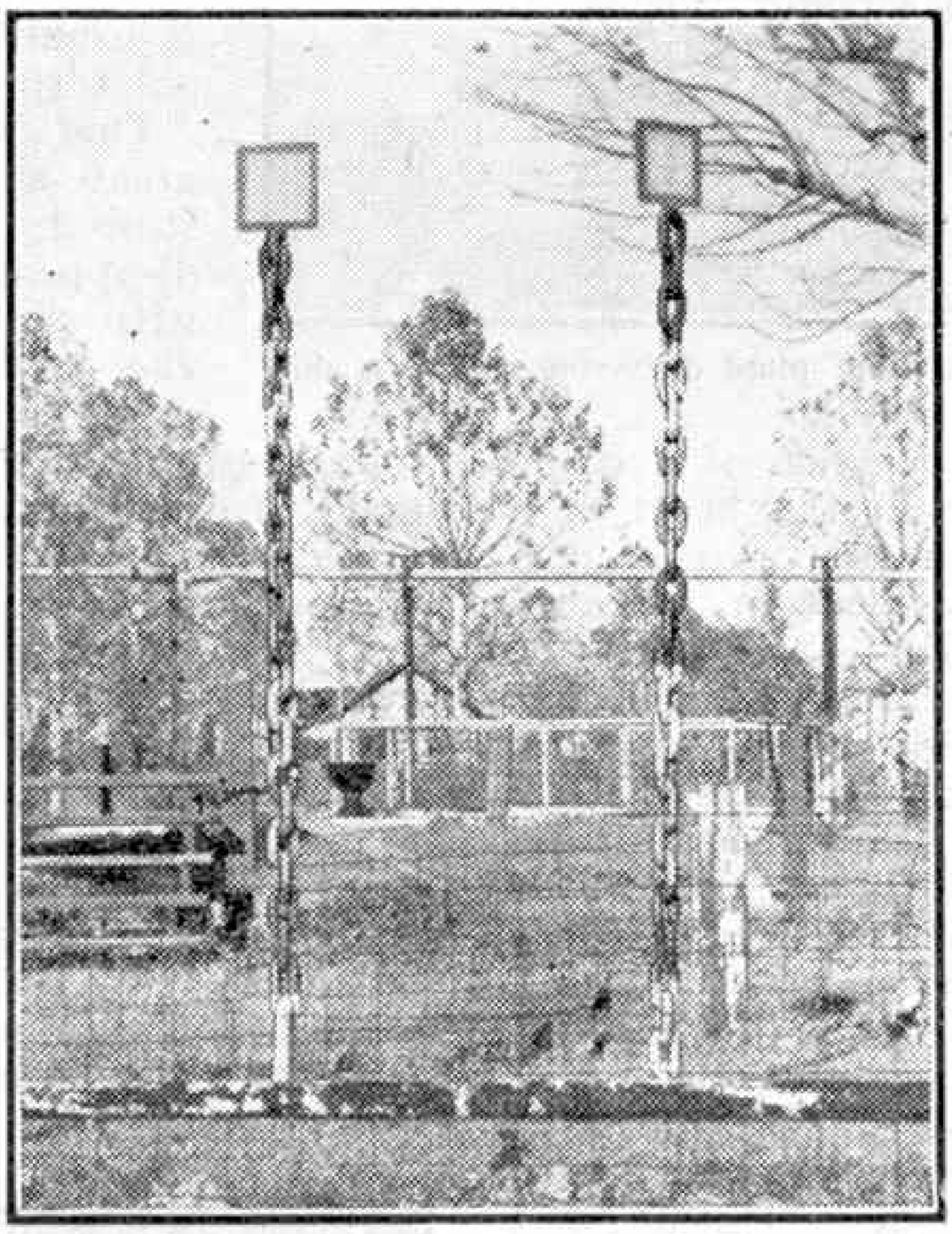
Of General Interest

Without Visible Means of Support

The two chains shown in the photograph on this page are to be seen in the Santa Fe Railway Park at Silsbee, Texas, in the United States. There they stand up in a manner that suggests something of the Hindu conjurer's famous rope trick, long a puzzle to westerners, for they seem to need support that is not obviously provided for them. They are unattended and always remain erect, with scarcely a movement of any kind even in the strongest wind.

The explanation of this apparent miracle is simple and interesting. At one time both chains were just as flexible as a chain is expected to be, and they were employed regularly in pulling derailed engines and wagons back on to the track. Their present rigid condition is the result of a pull so terrific that the welds of the links began to give, allowing these to close tightly on each other. The first of the two chains was tugged into rigidity 30 years ago, but the second reached this state when it was used in a derailment in 1938. An interesting point is that in each case all the welds began to spread, and to clamp the links next to them, at practically the same time.

When the first chain became a solid mass it aroused so much interest as an oddity that the officials of the Santa Fe Railway placed it in the company's park at Silsbee, where it was joined later by the second. To-day the two stand like sentinels in a corner of the Park, curiosities that amaze countless visitors.



Chains that stand up by themselves! They are in the Santa Fe Railway Park at Silsbee, Texas, U.S.A. Photograph by courtesy of "The Santa Fe Magazine."

An Ocean Lorry Hopper

Even the shark has friends. As it swims about the ocean it is accompanied by pilot fish and other creatures that are believed by fishermen to guide it towards food and warn it of dangers ahead.

Many of these fish attach themselves to individual sharks, apparently forming close alliances or friendships. There is one companion of the shark that seems to behave in a different way, however. This is the remora, a slender fish, olive and silver in colour, with a black band running from head to tail along each side. The remora is a strong swimmer, and appears to move about easily in complete independence. At times however it fastens on to a shark, making use of a strange sucker at the top of its head and neck. With the aid of this it takes a very firm hold, but it can itself break the vacuum under the sucker without difficulty when it wishes to swim off in pursuit of food.

There does not seem to be any real purpose about the rides that the remora steals from sharks, and from other fish, turtles or even ships, for it is not particular. In many cases it is a faster and more agile swimmer than its host, and apparently it is just an urchin of the ocean world, stealing rides much as reckless small boys snatch lifts on the backs of lorries and motor cars, though with less risk.

Haymaking Indoors

The possibility of heavy rain is always a threat to the hay crop of Great Britain, for even if this is not ruined, its value is reduced considerably when it is well washed by rain before it can be dried and stacked. For this reason there is real interest in schemes for indoor haymaking. These have been tried in Sweden and in the United States, and the general principle is the same for all of them, the hay being spread out on boards in such a way that dry air can be blown through it by means of fans. In Sweden a kind of box is used. In this the upper part has sloping boards set across it, down which the hay can be pushed. The dried product is taken out of the lower part of the box daily, and fresh grass is introduced at the top. An American plan is to arrange ducts on the floor of a loft in which the hay is placed, and to blow air through the ducts to extract the moisture. In another drier that has been introduced in Great Britain the crop is stacked round a cone of steam coils, and air heated by pumping it continuously into the hollow of the cone finds its way out through the hay and dries it.

Corn in the sheaf can be handled in a similar manner, so that drying plants would form an alternative to the combine harvester for ensuring the safety of the crop, whatever the weather.

With the combine harvester the corn is threshed as it is cut, so that it is unnecessary to leave the sheaves to dry in the stook in the field, with the risk of being soaked by rain. Special plant is used to dry the grain and to bring it into condition for milling.

Flying Oysters

Live oysters from Falmouth have been flown to South Africa, packed in barrels between layers of damp sacking. There were 500 of them, the first of 3,000 that will eventually be sent out. On arrival they will be placed in a tank at Cape Town Aquarium to acclimatise themselves before they are transferred to the sea. The journey will take under five days. The oysters can live out of water for not more than ten days, so that only by air could they be transported to South Africa.

The oysters of South Africa are coarse and unpalatable in comparison with those of Great Britain, and anyway they are disappearing. An effort therefore is being made to establish British oysters there, and the 3,000 oysters are to be sent out for the South African Fisheries' Development Corporation. If the experiment is a success millions of oysters may make the long trip by air from Great Britain to South Africa.

Photography

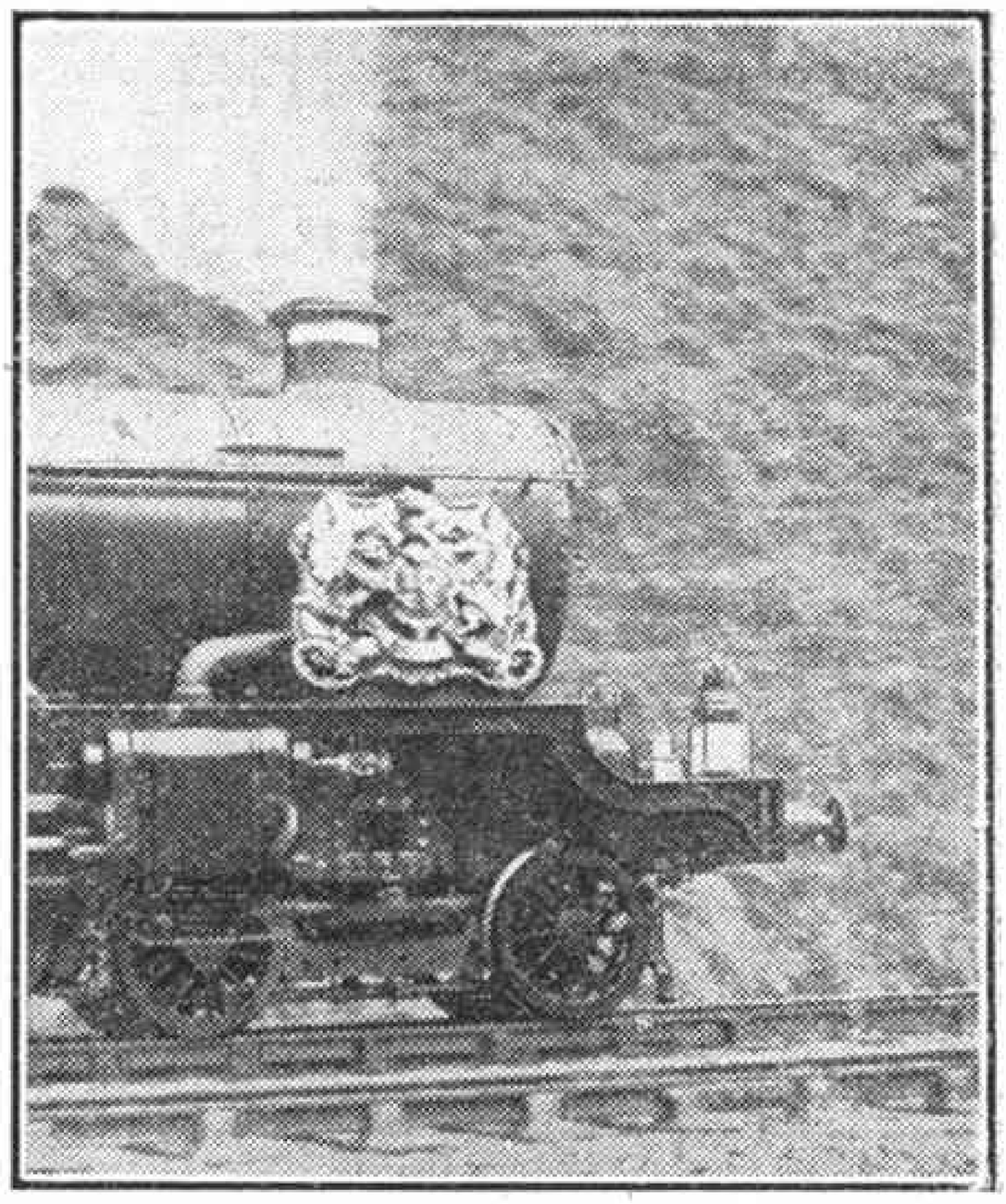
Moving Trains

By "Shed Superintendent"

ANY reader who possesses a camera with a shutter that can be set to give an exposure of 1/100th second will find that interesting pictures can be obtained of moving trains from angles other than the conventional three-quarter head-on view.

One method consists of swinging the camera, to take a broadside view of an engine or part of a train as it passes. The accompanying illustration of the front of a Royal train engine was taken in this manner. The art of correct swing needs a little practice. The camera is best used at eye level, and the rate of swing of the camera must correspond with the movement of the train, in order to give a sharp picture of the train against a blurred background. The swing must follow through, and must not be stopped at the moment of exposure.

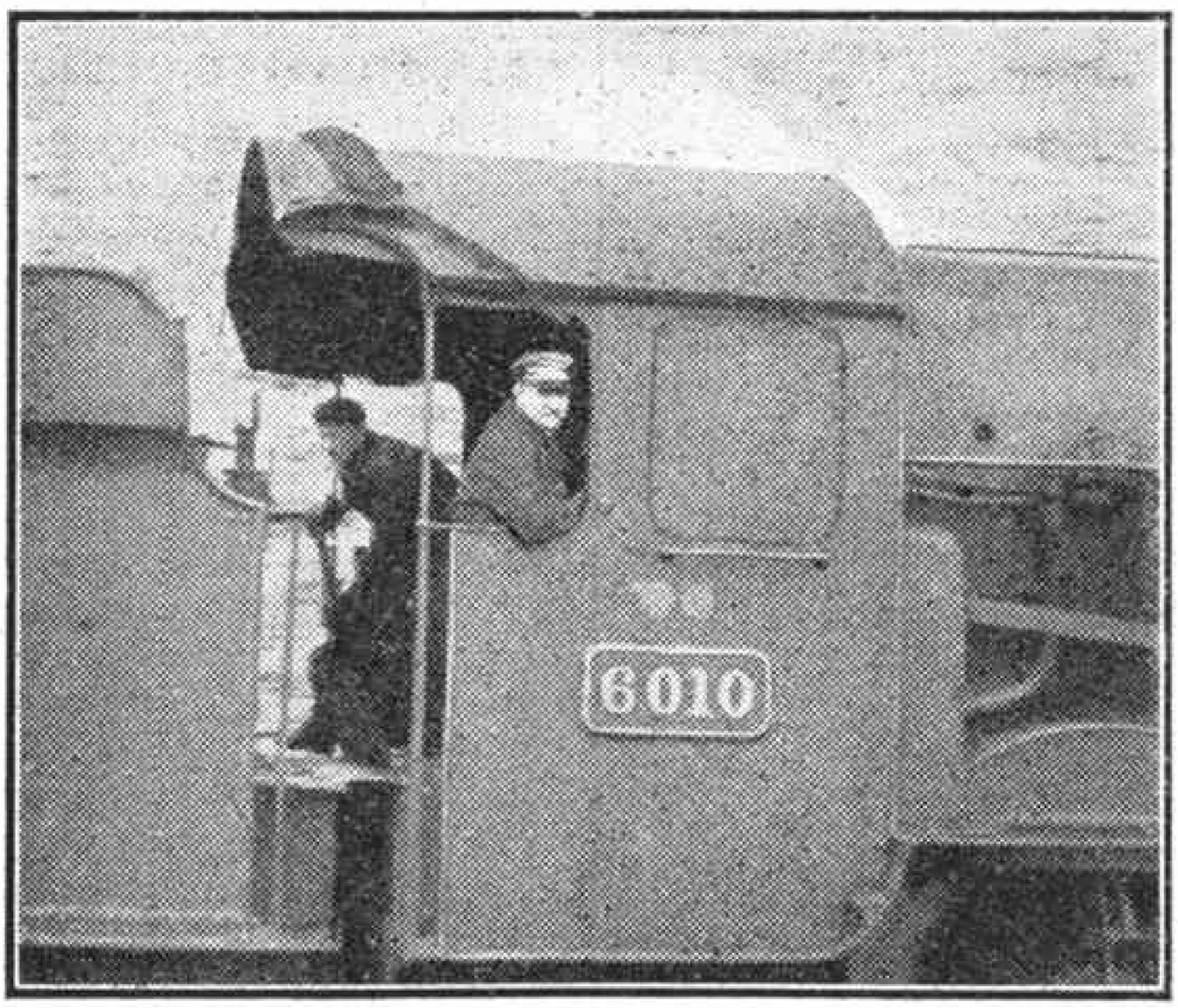
The photographer should stand well back from the line, at the same time making sure that as little foreground as possible is included, since this will also appear blurred by the camera movement. It is also advisable to choose a site, such as a junction, where the train is not going at full speed.



Decorations on the front of a G.W.R. engine hauling the Royal Train.

Another method is to take pictures out of the window of a moving train. The photograph of the driver of the "*Cornish Riviera*" was taken from the window of a local train near Reading which was proceeding in the same direction on the adjacent line, and the difference in the speeds of the two trains at that particular moment was so slight as to make this picture quite a simple matter. The photographer can stand at an open window—preferably in the corridor—without exposing himself to danger by putting his head or the camera outside the carriage. He should take up an easy stance on his feet, taking care not to lean against the structure of the coach, which would have the effect of transmitting vibrations to the camera.

The photograph just referred to is of particular interest as recording a fleeting glimpse of the normal routine of the cab—the driver at his window, his mate busy with his scoop-like firing shovel. It would be difficult, if not impossible, to get such a picture in any other way. We hope that many readers will try this scheme during the summer and send in their results with a view to publication if suitable.



The driver of the "Cornish Riviera." Taken from the window of a slow train.

Among the Model-Builders

By "Spanner"

CANTILEVER SPRINGS FOR MODEL CARS

P. Ashbridge, Nottingham, is interested in model motor cars, and asks for details of suitable spring arrangements for the back axle. There are several different types of springs for this purpose and I reproduce an illustration of one variety that I suggest for his use. This is the cantilever type shown in Fig. 1, and while it is intended primarily for supporting the rear axle of a vehicle, it is sometimes used for the front axles also. The leaf spring is built up from 2", 2½", 3½", 4½" and 5½" Strips, placed face to face and connected together as shown. The leaf is then fitted with three ½" × ½" Angle Brackets 1.

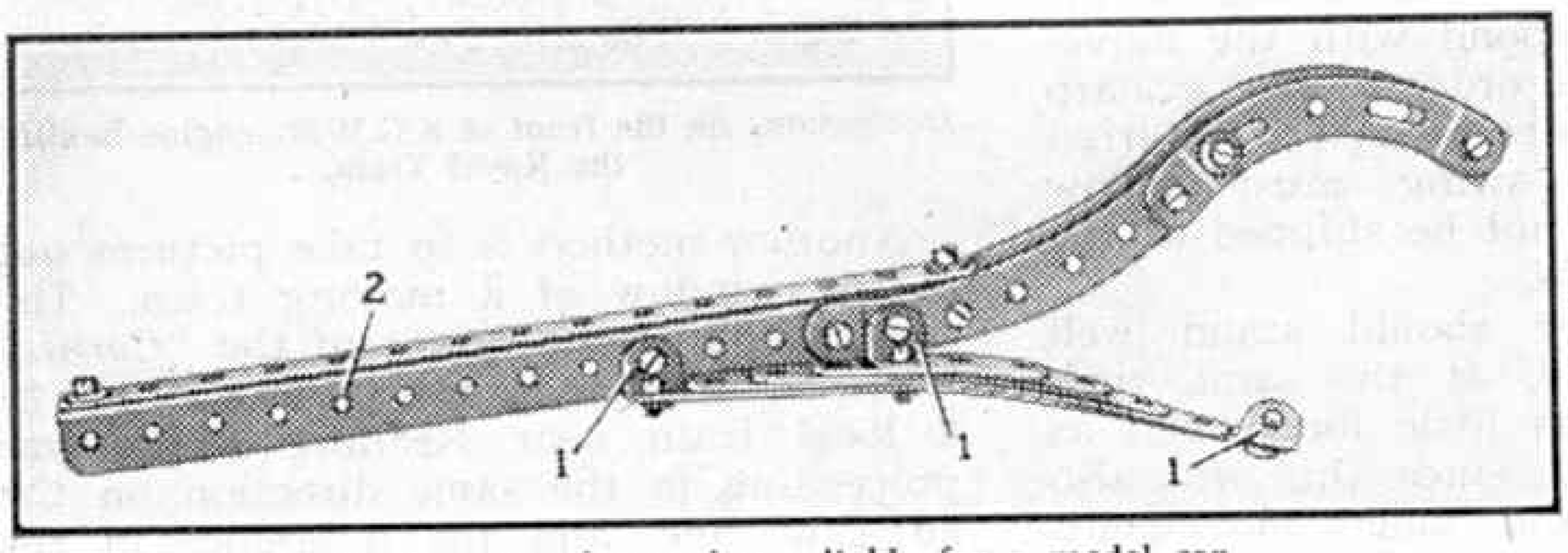


Fig. 1. A suspension spring suitable for a model car.

A FINE MECCANO CINEMATOGRAPH

One of the most interesting subjects for a Meccano enthusiast to tackle is a motion picture cinematograph. The mechanisms incorporated in a machine of this kind are most ingenious and varied, and their reproduction from Meccano parts is a great test of a model-builder's ingenuity. It is not surprising therefore that many successful cinematographs have featured from time to time among prize-winning models in the Magazine competitions, and this month I am able to illustrate another of these models which was built some time ago by W. G. Hemsley, Cambridge, serving in the R.A.S.C. during the war. Apart from the optical system and the driving motor, the machine is built almost entirely from Meccano parts. Among the interesting fittings are a blower motor for cooling purposes, switchboard, ammeter and pilot light provided with its own transformer. The machine projects excellent pictures and was the subject of many complimentary tributes from Mr. Hemsley's colleagues in the Service.

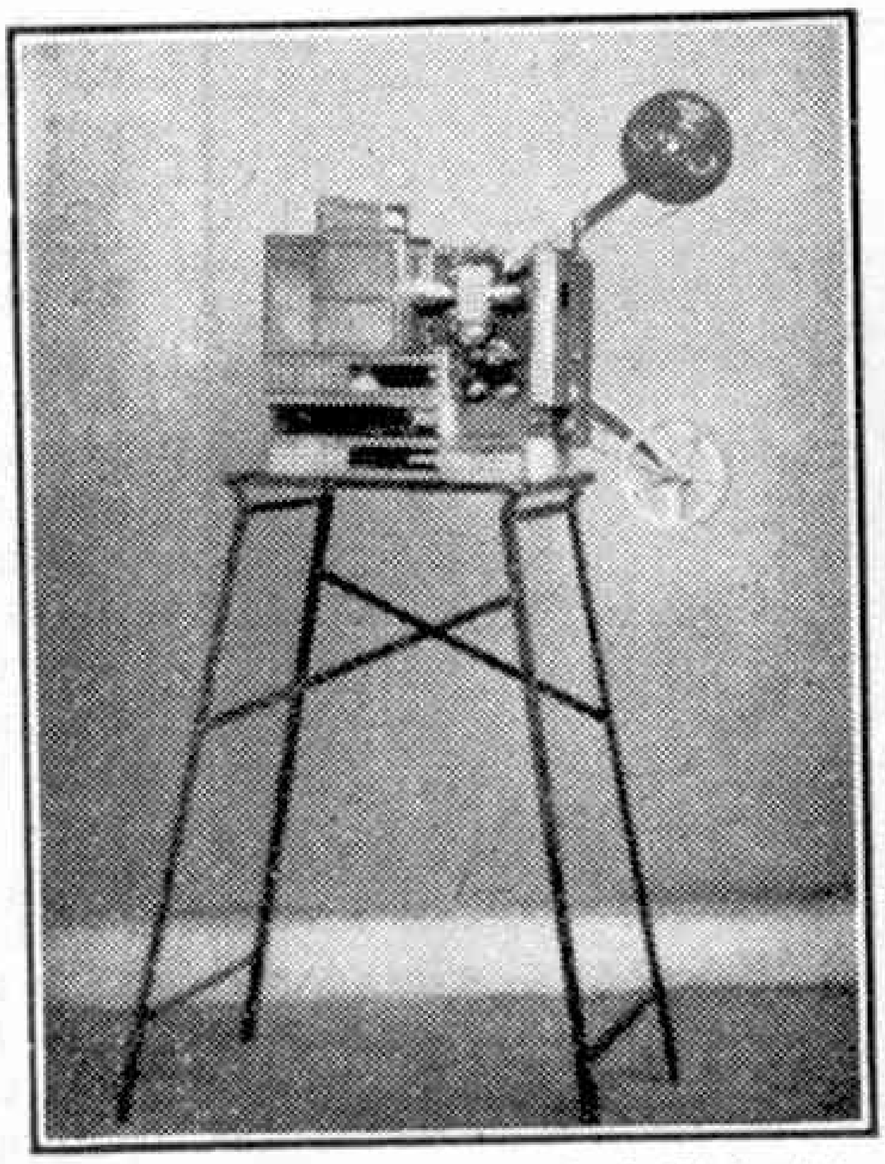


Fig. 2. The cinematograph built by Mr. W. G. Hemsley.

A. C. Langham, Bassett, Southampton, who is a keen Meccano enthusiast.

A NOVEL LUBRICATING DEVICE

The smooth running and working life of any mechanism depends very greatly on efficient lubrication of all moving parts in contact with one another, and engineers take great care to ensure that every part of a bearing or other surface in contact with a moving part is always well greased or oiled. Usually special devices are fitted to machines for this purpose, and by their means wear of parts and losses of power through friction are reduced as much as possible.

Trevor Beadle, Dunedin, New Zealand, has been experimenting with various lubrication methods in his models, and he sent to me recently a sketch and details of a novel lubricator constructed from Flanged Wheels. The sketch is reproduced in Fig. 3. The two Flanged Wheels 4 and 5 are bound together flange to flange with a strip of black insulation tape, and they form a cup to hold the lubricant. In one of the examples shown in Fig. 3 this oil cup is used to lubricate the piston rod of a steam engine, and a piece of copper tubing is used to feed the oil and is fitted into the bore of the boss of one Flanged Wheel. The oil cup contains a wad of cotton wool, which prevents the oil escaping too quickly.

In the other example shown the pipe is replaced by a strip of rag 3, which is arranged to touch the cranks during each revolution. To fill the cup the pin 8 is removed and the spout of an oil can inserted in the bore of the boss.

DELAYED ACTION RELEASE FOR CAMERA SHUTTER

Owners of cameras that do not incorporate a delayed-action shutter release can build an efficient substitute from Meccano parts that will enable them to include themselves in the pictures they take. An example of such a mechanism

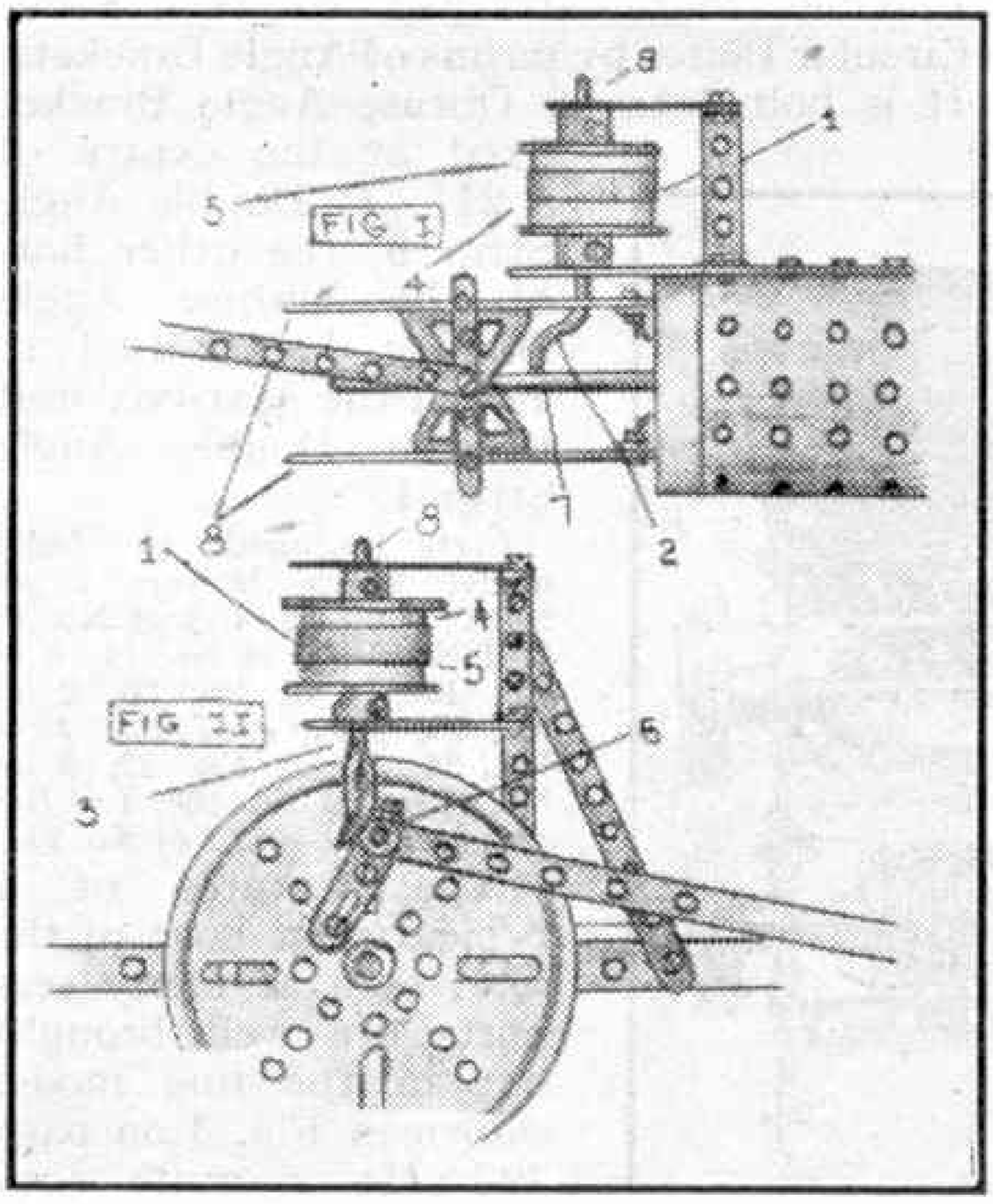


Fig. 3. Examples of the use of the lubricating device designed by T. Beadle Dunedin, New Zealand.

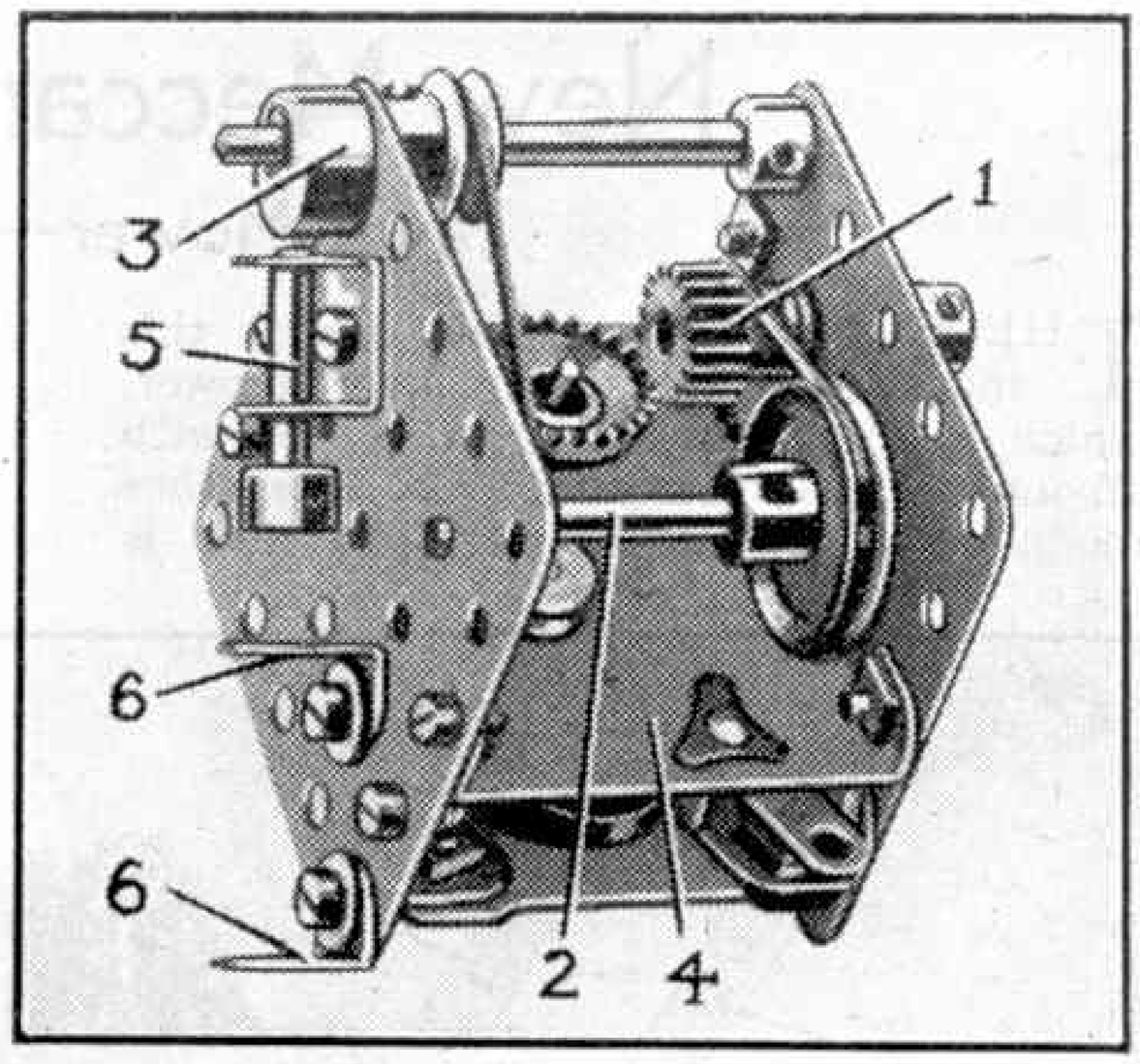


Fig. 4. A delayed action shutter release for a camera.

is shown in Fig. 4. It was designed by N. Jones, Lincoln. To use the mechanism the camera shutter is first set at the required speed, and then the flexible cable is slipped in the Angle Brackets on the side plate of the mechanism. The release mechanism is then set in operation, and after a period of about 15 seconds a rotating cam 3 presses on the cable plunger and releases the shutter.

The mechanism is operated by a *Magic* Motor 4, to which are bolted two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates as shown. A $\frac{3}{4}''$ Contrate is fastened by two grub screws, on the winding shaft, and a $\frac{1}{2}''$ Pinion 1 fastened on a 1″ Rod is arranged to mesh with it. A 2″ Rod 2 is then journalled in the Flat Plates and is held in position by Collars. It carries a 1″ Pulley, which is connected by a Driving Band to the boss of the $\frac{1}{2}''$ Pinion as shown.

A second Driving Band passes around the 2″ Rod and also around a $\frac{1}{2}''$ Pulley on a $2\frac{1}{2}''$ Rod that carries the cam 3. This cam is formed by fitting a Collar on the Rod and pressing over it a disc of hard rubber in which a hole is cut about $\frac{1}{8}''$ out of centre. A 1″ Rod **5** bears against the cam and is held in a Double Bracket by a Collar and Spring Clip. The Angle Brackets 6 are now placed in the manner shown to receive the flexible cable. A slot is cut through to the hole in one lug of the Brackets in order to allow the flexible cable to be inserted. The cable should be removed from the Brackets immediately the shutter has been released, to prevent the film from being exposed again after another 15 seconds have elapsed.

New Meccano Models

Lawn Mower—Pilot Boat

THE first of our two new models this month is a realistic lawn mower, which is shown complete in Fig. 1, with an underneath view in Fig. 2. The other model is a fine sturdy pilot boat and is shown in Fig. 3 on the opposite page.

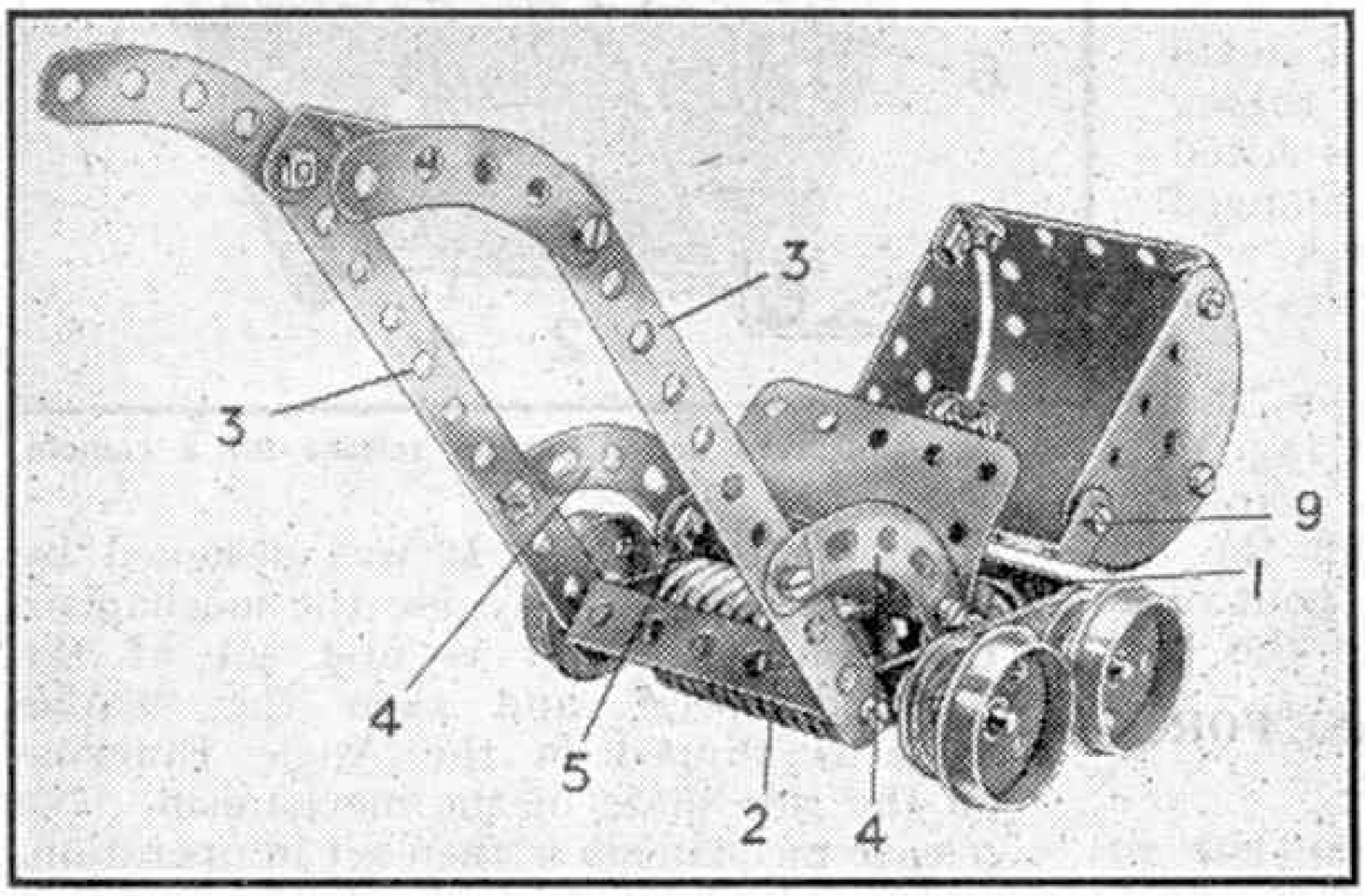


Fig. 1. This model Lawn Mower is fitted with a cutting cylinder, roller and grass box.

The lawn mower is one of the kind that incorporates a roller drum mounted behind the cutting cylinder. It is best to commence building it by bolting a 3″ Strip to each end of a 2½″ Double Angle Strip 1. The other ends of the Strips are bolted to a second 2½″ × ½″ Double Angle Strip 2, together with 5½″ Strips 3. The curved handles are 2½″ Curved Strips, and the 5½″ Strips are spaced apart at their upper ends by a third 2½″ × ½″ Double Angle Strip. The sides of the handle are braced to the frame by two Curved Strips 4, the lower ends of which are bolted to Flat Brackets fixed to the frame sides as shown at 5. The ejector plate, which directs the grass cuttings into the grass box, consists of a 2½″ × 1½″ Double Angle Strip held by the same bolts that secure the Flat Brackets to the Curved Strips 4.

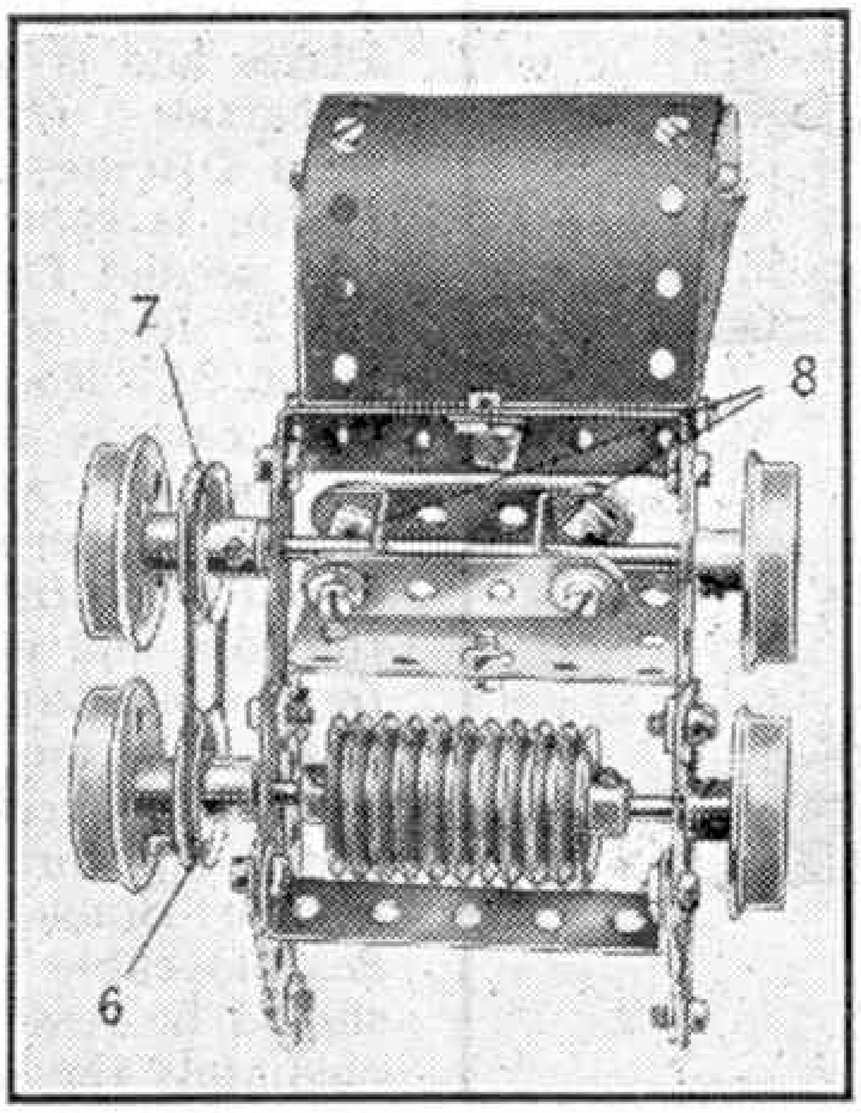


Fig. 2. An underneath view of the Meccano Lawn Mower.

The roller, wheels and cutting cylinder are seen better in Fig. 2, which shows an underneath view of the model. The roller consists of several loose 1″ Pulleys mounted together on a 4″ Rod, which is journalled in the 3″ Strips forming the sides of the frame. The Rod carries also a 1″ fast Pulley 6 outside the frame, and at each end a 1⅛″ Flanged Wheel. The 1″ fast Pulley 6 is connected by a Driving Band to another similar Pulley 7 on the Rod that carries the cutting cylinder.

The cutting cylinder consists of two Double Brackets 8 joined together as shown by two 2″ Strips. This unit is mounted on the Rod and retained in place by Spring Clips.

The grass box consists of a 4½″ × 2½″ Flexible Plate attached to two Semi-Circular Plates by means of Angle Brackets. It is bolted to an Obtuse Angle Bracket fixed at the centre of a 2½″ × ½″ Double Angle Strip 9, the other hole of the Obtuse Angle Bracket being used to attach the gear-box unit to the Double Angle Strip 1.

Parts required to build model Lawn Mower: 2 of No. 2; 2 of No. 4; 2 of No. 6; 2 of No. 10; 2 of No. 11; 1 of No. 12c; 4 of No. 20; 2 of No. 22; 10 of No. 22a; 2 of No. 35; 30 of No. 37; 5 of No. 48a; 1 of No. 186; 1 of No. 188; 1 of No. 191; 2 of No. 214.

The features of a typical pilot boat of the kind seen at many seaports are well brought out in the fine model shown in Fig. 3 on page 293. It is quite easy to construct, and a detailed description is

not necessary, as most of its constructional features can be seen clearly in the illustration. The Strips forming the sides of the hull are spaced apart by Double Angle Strips and the deck is filled in by a Flanged Sector Plate 1, and Flat and Flexible Plates. At the stern a rounded effect is provided by a Curved Strip 2. The bridge structure is fastened at the sides to 1" Corner Brackets 3 and 4, and each side of the deck house consists of two Flat Girders overlapped and bolted together.

Each lifeboat consists of two $2\frac{1}{2}$" Strips bolted together at each end, and these are slung from davits consisting of stout wire bent to the required shape.

The funnel is formed from two Sleeve Pieces joined together by a Chimney Adaptor, and it is fixed to the deck by pushing it over a second Chimney Adaptor bolted to the deck behind the bridge. The letters and figures forming the word and number "Pilot No. 1" can either be cut from white paper or painted on the vessel's side.

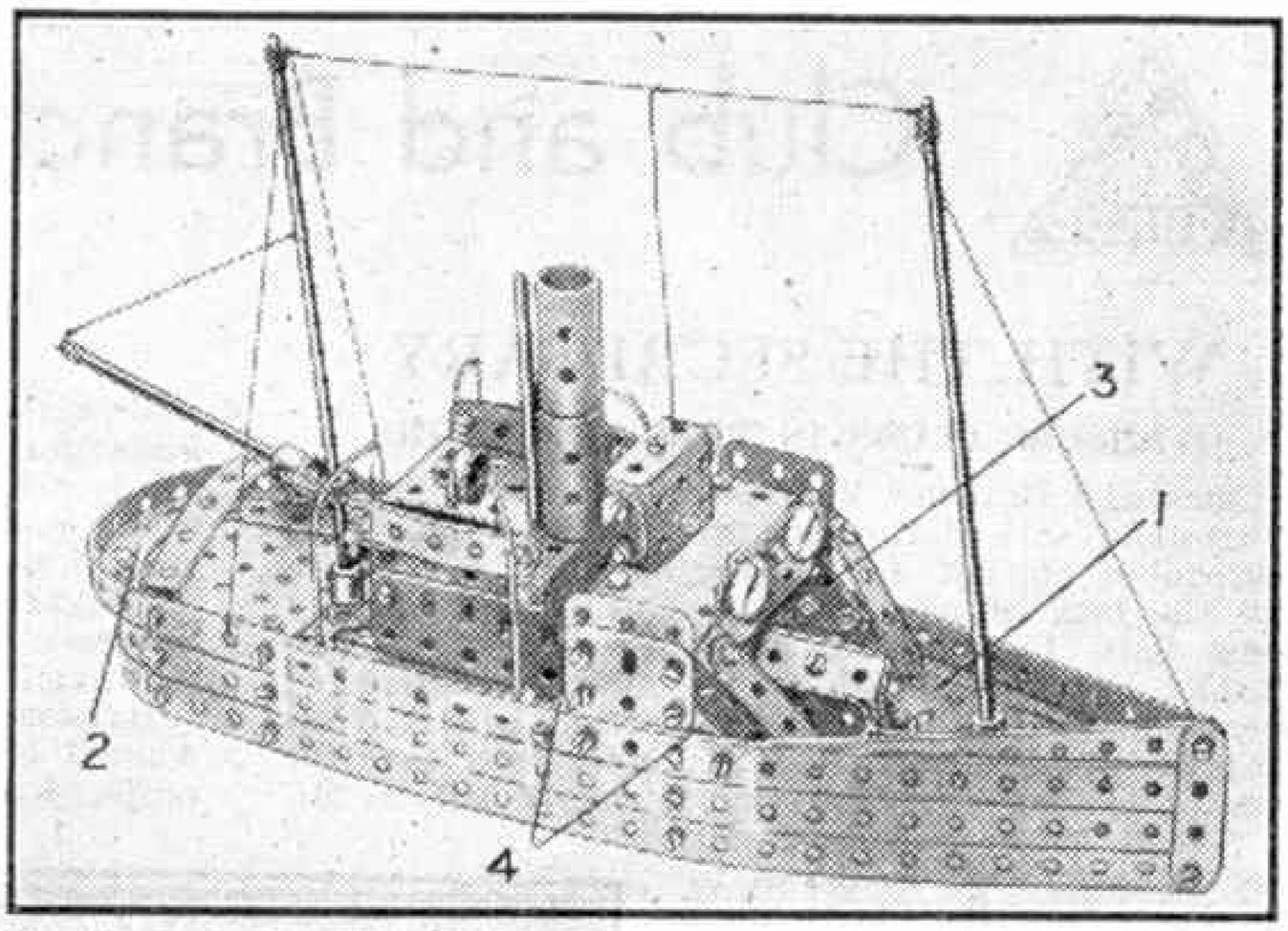


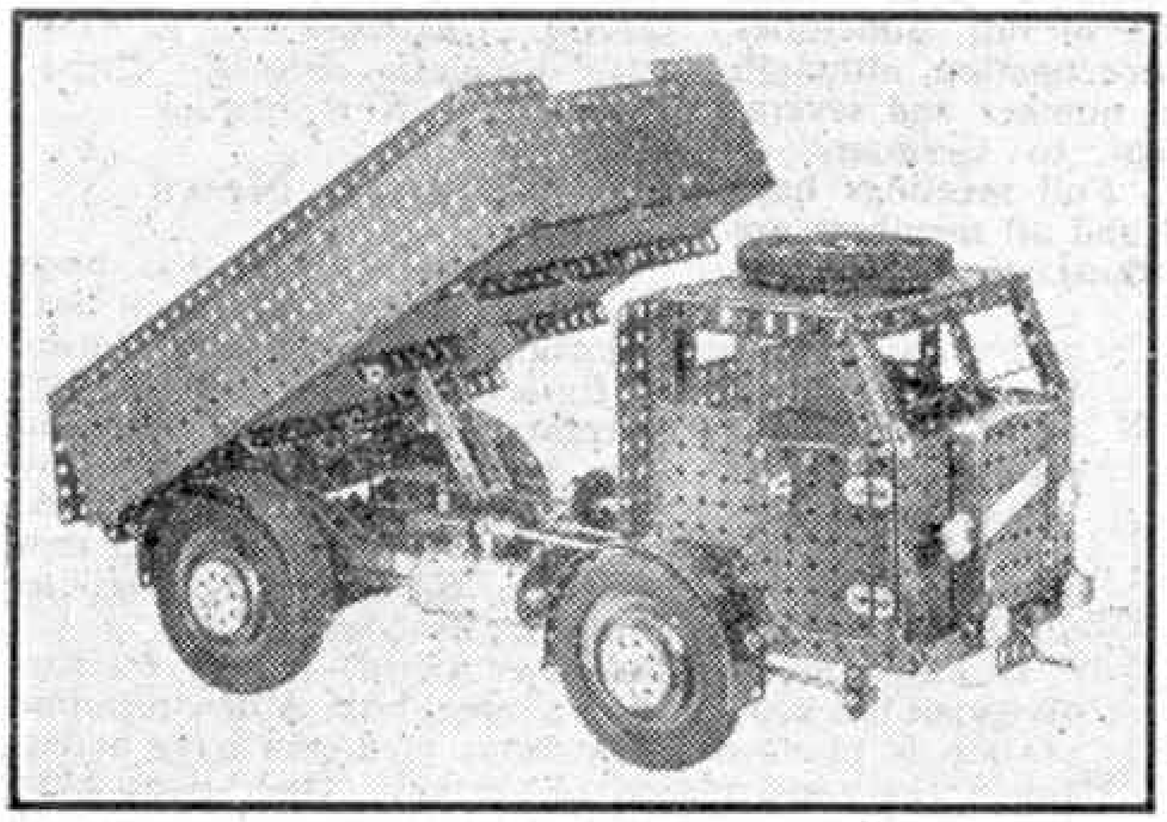
Fig. 3. A sturdy and realistic Pilot Boat that makes a fine subject for ship lovers.

Parts required to build model Pilot Boat: 6 of No. 1; 7 of No. 2; 4 of No. 2a; 6 of No. 3; 4 of No. 5; 5 of No. 6; 4 of No. 9F; 2 of No. 15; 2 of No. 16; 1 of No. 23a; 67 of No. 37; 6 of No. 48; 1 of No. 48c; 1 of No. 54a; 2 of No. 72; 1 of No. 82; 4 of No. 103h; 4 of No. 133a; 2 of No. 163; 2 of No. 164; 2 of No. 179; 2 of No. 188; 2 of No. 189.

June "Simplicity" Model-Building Competition

A Reminder to Intending Competitors

In the June issue of the *"M.M."* we announced details of a new "Simplicity" Model-Building Competition in which prizes will be awarded to model-builders who succeed in constructing the most ingenious and realistic models of any kind from the smallest number of Meccano parts.



Many interesting constructional features are to be seen in this excellent model tipping motor lorry built by A. Aikman, Steyning.

This Contest is still open, and readers who have not yet forwarded details of their models should do so as soon as possible. The great feature of this contest is that owners of even the smallest Outfits can compete on level terms with the more fortunate possessors of large Outfits.

When the model is completed the competitor should prepare either a photograph or a sketch of it. He should then write his age, name and address on the back of the illustration and send it to *"Simplicity Model-Building Contest, Meccano Ltd., Binns Road, Liverpool 13."* The actual model must not be sent.

The competition will be divided into two Sections: A, for readers of all ages living in the British Isles; B, for readers of all ages living Overseas. The prizes to be awarded in each section are: First, Cheque for £2/2/–; Second, Cheque for £1/1/–; Third, P.O. for 10/6. Consolation Awards of 5/– each. The closing date for Section A is 31st July, and for Section B 30th November.

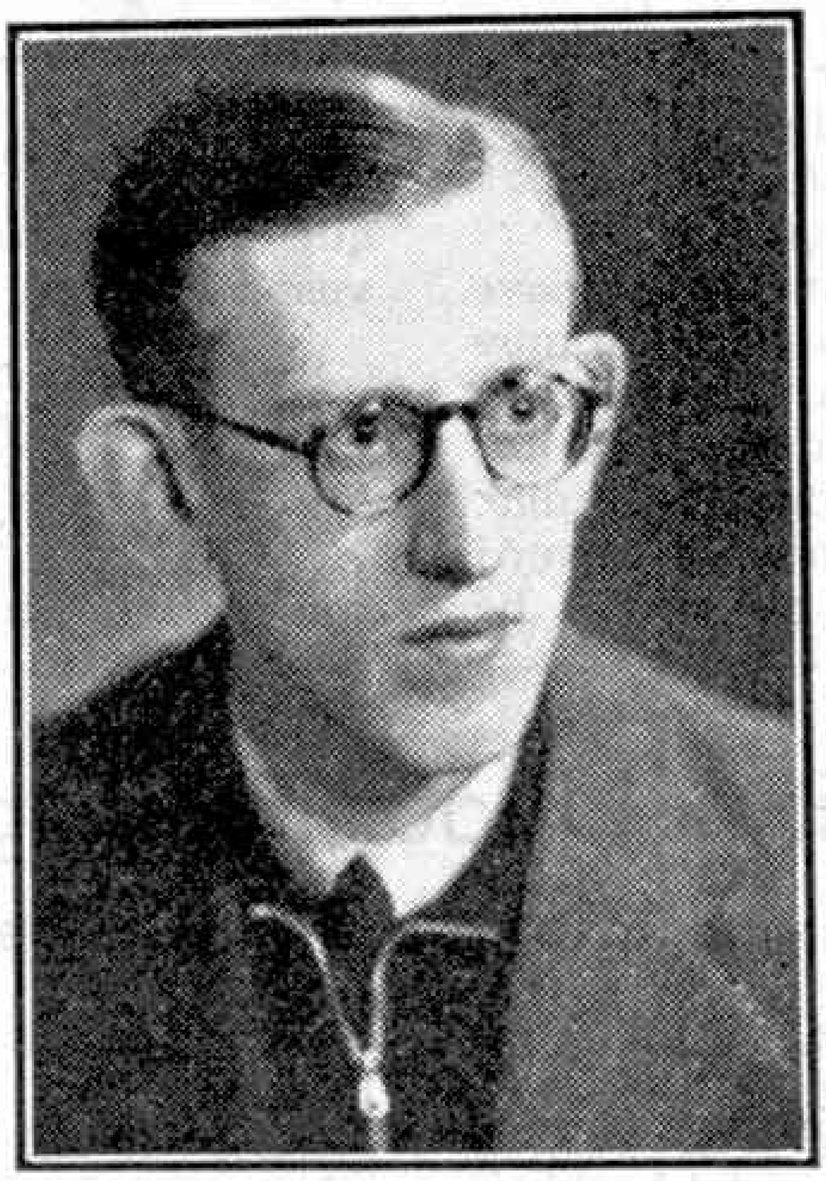
Club and Branch News

WITH THE SECRETARY

OVERSEAS CLUBS IN THE WAR YEARS

Clubs and Branches overseas had great difficulties to contend with during the war years, notably the absence of officials and senior members on service and the lack of new Meccano Outfits and Hornby Train Sets. In some instances the loss of capable officials was made good by the efforts of interested friends, as in the case of the Christchurch M.C., New Zealand, where Mr. E. A. Gay kindly took over the task of leading the Club that formerly fell to Mr. J. Ancall. How successful Mr. Gay's efforts were is shown by the report from the Christchurch M.C. that appears on this page. In other cases younger members of the Club who remained at home took over the burden. This happened with the Maylands (Perth) M.C. The departure of Mr. V. Malmgreen, the Leader, for war service was a sad blow to this Western Australian Club; but Mr. R. Whitney became Leader, and with the aid of other members who, like himself, had grown up in the Club, he kept the Club going in fine style. This proves once more the wisdom of giving younger members experience in Club business and organisation.

The Malvern (Johannesburg) M.C. has continued to do excellent work during the war in spite of the absence on war service of Mr. E. W. Sykes, Leader, and a large proportion of senior members. Here again experience gained in official positions by younger members of the Club has been turned to good advantage, and the splendid work of the girl members of this South African Club also calls for special commendation. Another overseas Club that has survived even greater difficulties is that at Maastricht, in Holland. Under the German occupation it was almost impossible to continue meetings there, and indeed several of the members were prisoners of war or were taken to Germany for forced labour, while others had to remain in hiding. Those who remained kept in touch with each other, however, meeting together for discussions occasionally, and so the way was kept open for a resumption of meetings when happier times came along.



Mr. F. L. Bingen has been Leader of the Maastricht (Holland) M.C. since November 1933. The club was affiliated with the Guild in March 1930. Excellent model-building meetings were the chief feature of its meetings. These were continued in spite of all difficulties during the German occupation, although they were fewer in number and several members were sent to Germany or forced into hiding. Full meetings have now been resumed and all members are very enthusiastic.

PROPOSED CLUBS

HERTFORD—R. Green, 3, Spinney Street, Gallows Hill Crescent, Hertford.

CROSSACRES—B. Smee, 24, Croftlands Road, Crossacres, Wythenshawe, Manchester.

EASTBOURNE—I. Sykes, 33, Seaside, Eastbourne, Sussex.

TOTTON—Mr. V. Johnson, Caldy, Testwood Place, Testwood Lane, Totton, Hants.

Club Notes

HUNTINGDON M.C.—Interesting visits have included inspection of various bridges, of which models afterwards were made. Model-building Evenings have been numerous, and Competitions have provided great fun and excitement. A Social has been held. A Magazine is now in production. Club roll: 63. *Secretary:* A. Goakes, Trinity House, Hartford Road, Huntingdon.

BARKER'S BUTTS (COVENTRY) M.C.—The 2nd Annual Exhibition attracted 700 visitors. A special project has been the construction of a Gauge O Electric Railway Track, and a second track round the Science Laboratory is to be constructed. Members are keen and the Club is so well organised that meetings almost run themselves. Club roll: 41. *Secretary:* P. Mayo, 35, Butt Lane, Allesley, Coventry.

ST. OSWALD'S (THORNTON HEATH) M.C.—Great interest was taken in preparations for the Club's May Exhibition, model-building being carried on in good style. Games Evenings and Questions Nights also have been held and attractive Visits are being arranged for the Summer Sessions. Club roll: 40. *Secretary:* D. R. C. Pavey, 37, Croft Road, Green Lane, Norbury, London S.W.16.

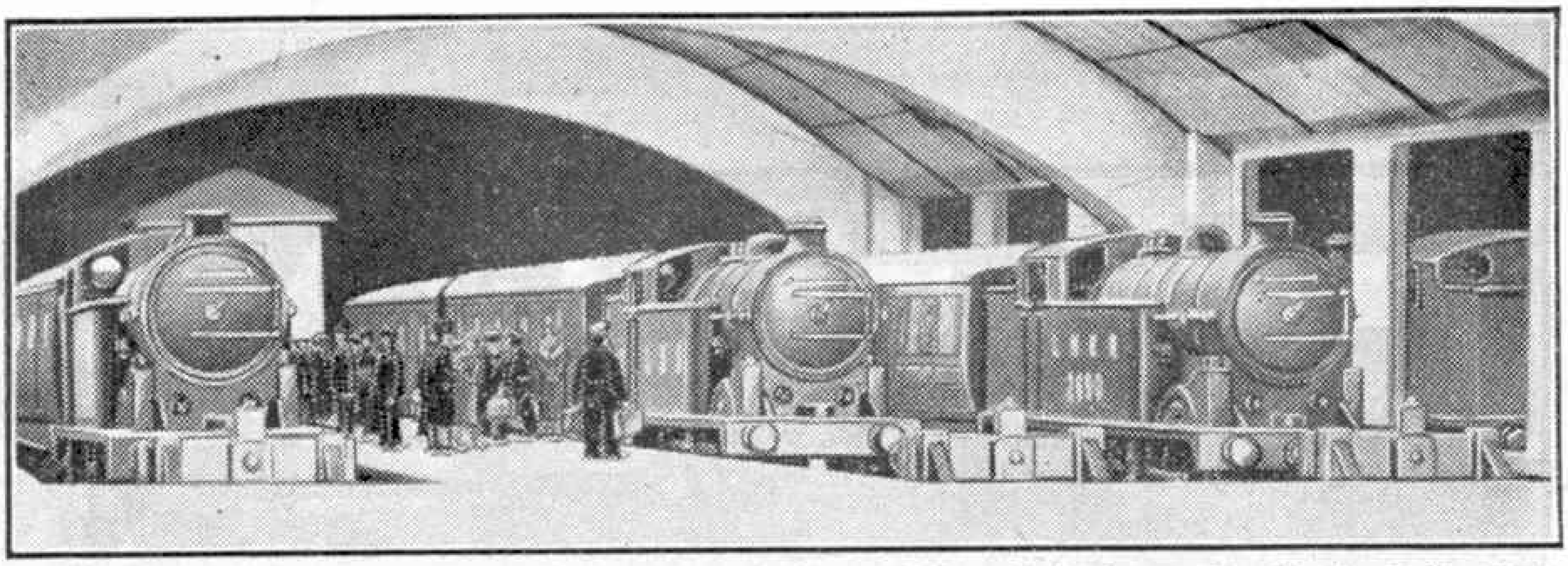
NEW ZEALAND

CHRISTCHURCH M.C. — Three meetings are being held monthly. One is a General Night for business, followed by Games and a Talk; the second is a model-building Evening; and on the third the Club's Hornby Railway is operated. At extra meetings members gather together and discuss problems or play games. Refreshments are always available. The Club is being strengthened by the return of members from active service. *Chairman:* E. A. Gay, 621, Colombo Street, Christchurch C.I., New Zealand.

Branch News

GIFFNOCK—A Visit has been paid to an important signal box, and many interesting locomotives were seen during this visit. A Talk on "*Building Passenger Stock*" has been given by the Secretary. In the Branch Room rolling stock has been overhauled and a Hornby "*Bramham Moor*" locomotive that has been obtained has passed its tests and is now in service on the new track, elevated on trestles. *Secretary:* R. Ogilvie, 20, Huntly Avenue, Giffnock, By Glasgow.

DURHAM SCHOOL RAILWAY CLUB—A very instructive visit has been paid to a signal box. A new terminal station is planned and various members have undertaken the construction of scenery. Operations have been made more interesting by the recent acquisition of a new "*Sir Nigel Gresley*." A Club Magazine is to be produced. *Secretary:* M. de Redder, "Collingwood," Underhill Road, Cleadon Sunderland.



"Rush hour" scene at a Dublo terminus showing suburban arrivals each in charge of a Hornby-Dublo Tank Locomotive, an ideal type for local passenger traffic.

Station Work in Hornby-Dublo

EVEN on the simplest layout, station working can be quite interesting, as the operator in addition to managing the actual train movements usually has the working of signals and points to see to as well. In this way he combines the work of the signalman, station staff and train crew in real practice. On larger layouts with several stations the work is sometimes divided up among several operators, and where each one is in charge of a station very realistic working is possible.

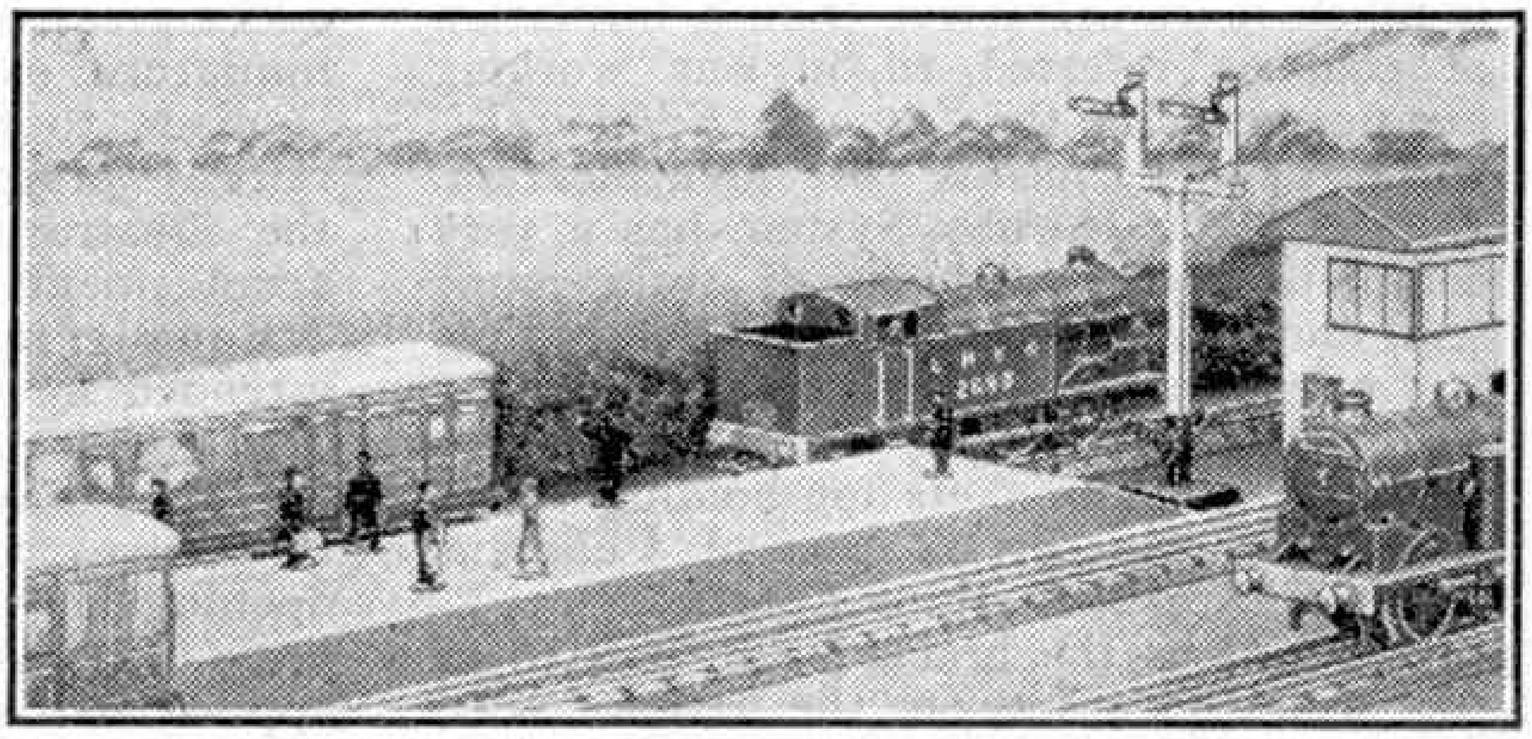
At the ordinary station on a single line railway without any sidings, and perhaps even without signals, chief interest will be concentrated in starting off the train in as realistic a manner as possible, and later in bringing it to a smooth stop. These simple operations can be quite entertaining, especially the fitting of the train to the station platform so that the "passengers" have no cause for complaint! With signals added, perhaps just hand-operated ones or even home-made substitutes, the placing of the arms to "danger" or "line clear" as required is an operation that makes things more realistic.

When a station has a siding, or better still a loop line, the possibilities are greatly increased. The siding can be used for the storage of the passenger train when "empty" or for goods wagons. Its inclusion makes possible the interesting evolutions necessary when a vehicle has to be attached to a passenger train. The conveyance of odd vans in this way is quite a feature of local train operation. Again, a pick-up goods train may require to take up or set down wagons, and just as the signalmen and station staff have to see this through in real practice, so the station operator of a Hornby-Dublo system controls the coupling and uncoupling, setting of points and movements of the engine that are necessary.

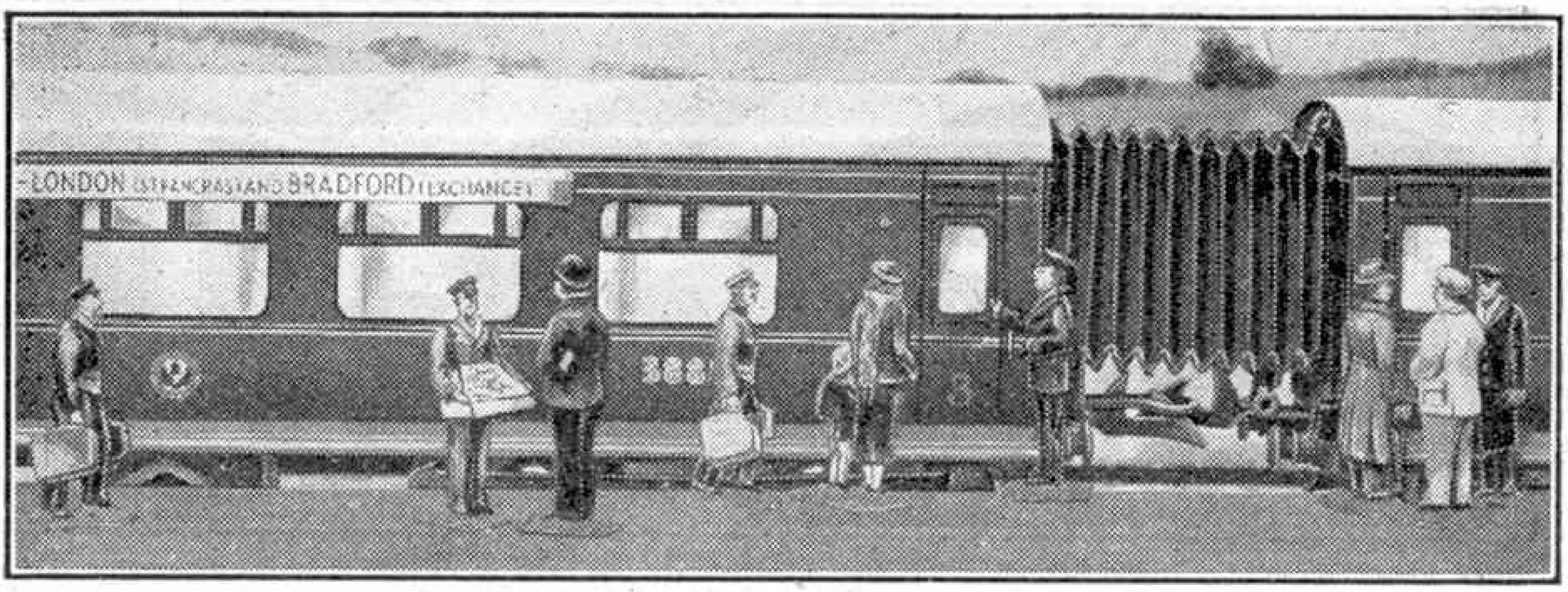
Sidings that are laid trailing to the usual direction of the trains are more handy for these shunting movements, as the engine can back the vehicles in, but is always free to draw them out. When the siding points are facing to the train approaching it, the only thing to do on a plain continuous track with no other feature than the siding is to halt the train before the points are reached. The engine is detached and run right round the layout to the opposite end of the train; it can then carry out the necessary movements in pushing or pulling the whole train until its formation is correct. Finally another run round the main track brings it to the head end of the train ready to proceed on its journey.

When a station has a loop line, working is easier. The loop provides the means of running the engine round the train when required as in operations of the kind just described. Again, if passenger trains are being run, the loop is specially useful when the terminal point has been reached and the engine has to get round the train in order to make the return journey. The signal and points operations necessary in this particular "episode" are fascinating, and the coupling-up necessary to complete it requires careful engine driving. The lower illustration on this page shows the last stage of a running-round operation; the engine is backing down carefully to the train, which will soon be on its way again.

The arrival and despatch of trains, the handling of empty stock, changes in train formation for particular services and the movement of engines all form part of the working of a terminal station. Variety in traffic will add to the fun. Thus trains of vans can be dealt with from time to time, preferably at one of the side platforms, as these are easy of access for road vehicles. Such trains will represent either parcels or perishable services, as dealing with them is part of the routine of a large terminus.



"Backing on"! A Hornby-Dublo Tank gently approaching its train waiting at the platform. This is a typical station operation.



A platform scene showing how the Hornby Corridor Connections are used between adjacent Coaches. The realistic train name board will be noted.

Fun With Your Hornby Railway

It's the Little Things that Matter

IT is a simple enough matter to assemble a layout, add one or two accessories, place an engine and train on the track and start operations. Plenty of fun can be had with these minimum requirements for running a train service, but much more enjoyment results when we attend to certain details that make such a difference to the running in general. The accompanying illustrations show points of special interest that can be followed up with advantage by Hornby Train owners.

A miniature express on a Hornby layout has an air of much greater importance when it is either named or carries destination boards than when it is not so distinguished. The use of a name even in miniature instantly gives a train a character or identity of its own. It becomes a train of which the owner will be proud, for the "Flying Scotsman" even in Gauge 0 is much more attractive than a formation of coaches referred to in our working arrangements as the *"10 a.m. Edinburgh,"* without any means of identification. Normally the Hornby System has a very complete and varied set of train name and destination boards. These simple but effective accessories are intended for use with those Hornby Coaches that are provided with brackets for holding them. These are the No. 2 Special Pullmans and the No. 2 Corridor Coaches.

In all cases the brackets are located in the usual position on the coach roofs, except on the L.M.S. Corridor Coaches. On these the brackets are placed so that the boards run above the coach windows where they can be read easily by the "passengers." The illustration on this page shows this arrangement, which gives the Hornby L.M.S. express the characteristic appearance of its full size counterpart.

When we require name or destination boards bearing titles that are not included in the series of boards, or if we have no boards anyhow, it is not a difficult matter to make our own substitutes at home. These should be marked out on thin white card in strips about 5 in. wide and ¼ in. deep. They should then be lettered, preferably in Indian ink, and carefully cut out; they are then ready for use.

Mention of Corridor Coaches immediately brings to mind the flexible Connections giving access between the coaches from end to end of the train. These fittings add a great deal to the realistic effect of a miniature express. A single connection is made to join two coaches in Hornby railway practice for various reasons and the illustration on this page shows the arrangement.

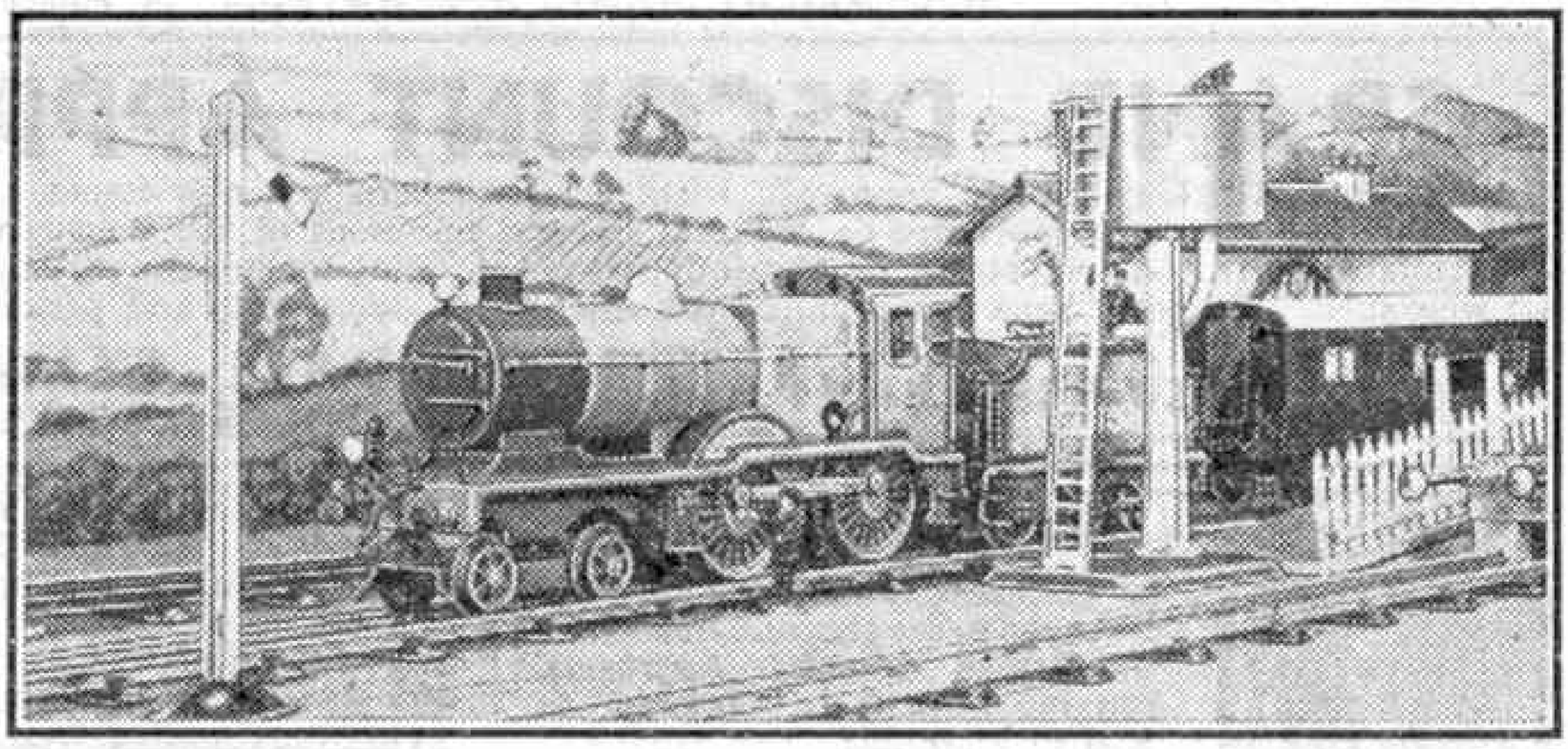
Equally important are the end plates intended for use at the outer ends of the first and last vehicle. These are fixed in the same way as the corridor connections themselves, and are intended to close the opening in the coach end in much the same way as the end shutters that are applied to corridor connections in actual practice.

The omission of connections or end

plates would give our train an empty, unfinished look that would completely spoil the effect. It is a good scheme to keep these fittings in a small tin or box reserved for them alone. They are then ready to hand when required, and if any of our corridor vehicles are short of these items they can be supplied from the common stock thus formed, as it is unlikely that every corridor coach on the line will be required for service at the same time.

The final touch is given, as is required by the Rule Book in actual practice, by the provision of the tail lamp at the end of the train. The train is incomplete without this detail, so that in all cases where lamp brackets are provided on rolling stock, such as the No. 1 Coaches and Guard's Vans, the No. 2 Passenger and No. 2 Corridor Coaches, we should be careful to place the lamp in position before the train leaves.

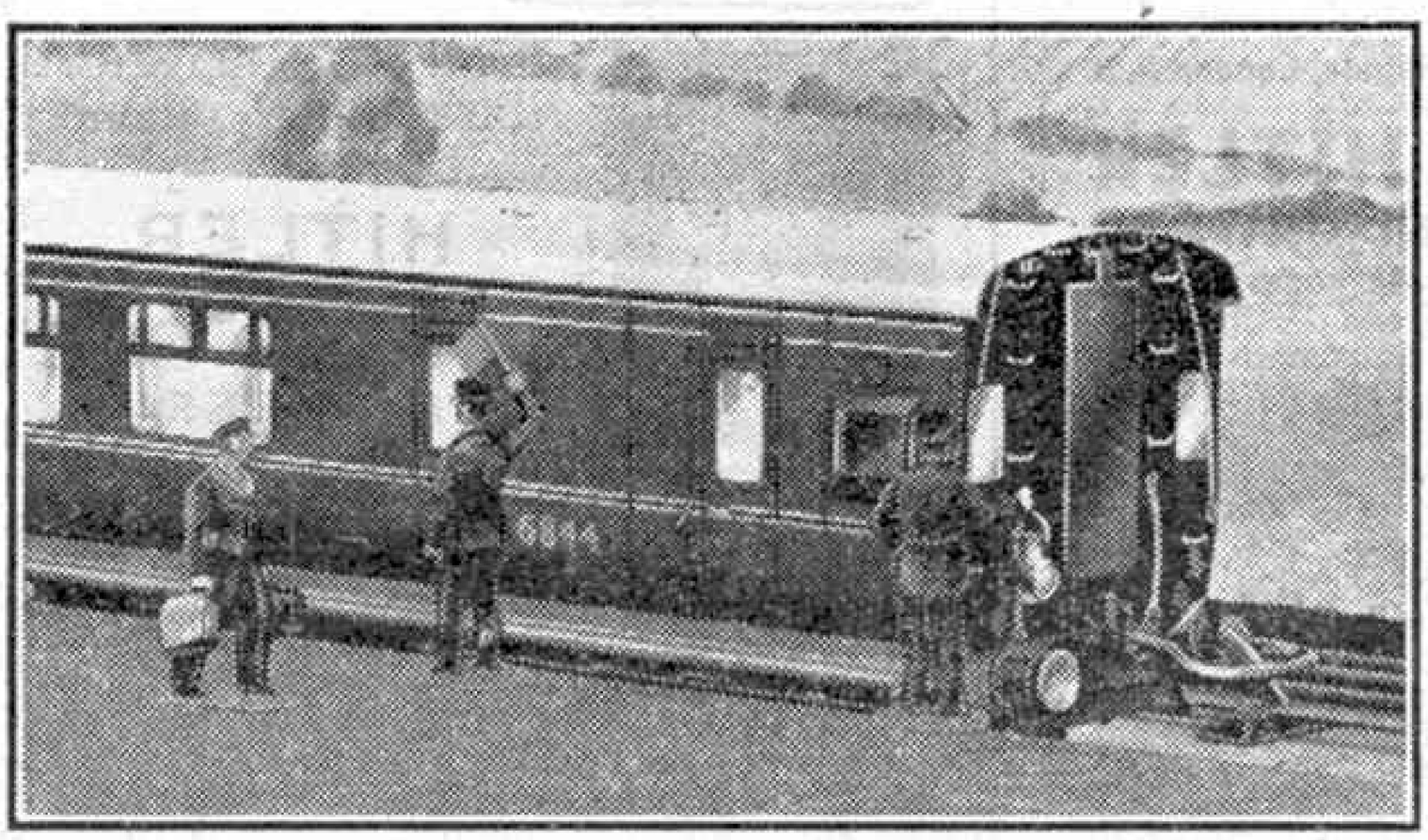
At terminals or at sidings where trains finish their journeys and then return in the opposite direction we must not forget to change the tail lamp from one end of the train to the other. If we have several of these lamps we can maintain a stock of them on the platform so that the exchange of tail lamps when necessary can be carried out easily and quickly. It would not be a bad idea to keep these spare lamps on a four-wheeled platform trolley which can be taken to anywhere on the platform where "new lamps for old" are required. This sort of job will appeal specially to the younger members of the "staff," who can usually be relied upon to carry it out with regularity.



Taking water! The crew of a Hornby S.R. 4-4-0 attend to their locomotive at an intermediate stop.

At the other end of the train the locomotive should display the correct headlamp indication for the class of train being run. This subject has been referred to on various occasions in these pages and most Hornby Railway owners know the more important indications that are in common use. In addition, owners of S.R. layouts should not omit to distinguish the locomotives on their trains by means of white discs that are used for route-indicating purposes during daylight. Details of home-made discs appeared in the *"M.M."* in May this year.

The upper illustration on this page shows a miniature S.R. *"Kent Coast Express"* on a Hornby layout headed by an "L1" class 4–4–0. The latter, which is "taking water" in realistic fashion, is a Hornby No. 2 Special Locomotive and carries the correct engine head signals or route indication for the road concerned, one disc in front of the chimney and one over the right hand buffer. When our engine stands at the Water Tank in this way it makes a great difference if a figure is placed on the tender top. If the water pipe will not "stay put," a piece of copper wire placed inside will improve matters.



"Right Away!" The tail lamp is placed in position immediately before the departure of the train.

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A **Wonderful** Packet of 30 AIR, TRIANGULAR and COMMEMORATIVES etc. **Liberia Triangular Air Mail,** Large new VICTORY stamp from INDIA (see March M.M.); **New Zealand** VICTORY (1919) Pictorial; U.S.A. "V" Pictorial; Germany (**Hitler's Head**); Large **Jamaica** Pictorial; **Australia** PEACE Issue, Commemorative; **War** time HOLLAND; Elusive GREENLAND; fine set of 3 **S. African Midgets; Brazil** (aeroplane); **Large** SYRIA Pictorial; OLD issues from **Turkey,** CAPE OF GOOD HOPE and **Transvaal;** Pictorial Palestine; **S. Rhodesia** K.G.VI, etc. Price only 5½d. to all asking to see my BARGAIN approvals and sending 2½d. Postage. (Without approvals Price 1/6). **Special Offers:** N.Z. Victory set Comp. M. 5/6, short set to 3d. at 1/-. BURMA Victory at 1/6; 4 Newfoundland (latest) 6d. (Postage extra). Stamps purchased. (Customers abroad please remit by British P.O.)

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58, High Street, Watford, Herts.

For other Stamp Advertisements see also pages 300 and vii.

Stamp Collecting

Southward to New Zealand

By F. Riley, B.Sc.

FROM the islands of the South Seas we must now travel southward to New Zealand in our Empire stamp tour. Here we are in one of the great self-governing Dominions, with a population mainly British, for the Maoris, who for centuries occupied and controlled New Zealand, number less than 100,000 in a total population of nearly 1,500,000. Many books have been written about this Dominion, the most distant part of the Empire from Great Britain, and books could be written about its stamps, including both early and more recent examples.

Two great islands form the mainland of New Zealand, the North Island and the South Island. The Dominion is almost 1,200 miles from Australia, and roughly the same distance from the nearest group of Pacific Islands, so that it is not surprising that the country was not discovered by Europeans until comparatively recent times. It was first seen by a white man in 1642, in which year Abel Tasman, a famous Dutch seaman, discovered the South Island, and it was he who actually gave the country its name. After that there was not even any casual exploration by white men until 127 years later, when Captain Cook explored the coast, landed there and claimed the country as British.

New Zealand is a beautiful country, with a great variety of scenery, from fertile plains and downs on which sheep are reared to wonderful mountain districts. Forests abound, with the great kauri pine prominent in them, and the New Zealand fern is so characteristic of the country that it has become a symbol for it. The South Island is very mountainous. The Southern Alps stretch along its entire length on the western side, and the snow-covered peaks, glaciers and lakes of this great range provide sport for mountaineers and recreation for holiday makers on a grand scale. The North Island has greater areas of level or rolling country, and the long peninsula at its northern end is the home of fruit growing, where palm trees, oranges and lemons flourish in a sub-tropical climate. In the centre of the island is an area of hot springs that have become famous all over the world.

New Zealand lends itself splendidly to the production of attractive stamps, for its mountains, glaciers, lakes and streams rival those of any part of the world in pictorial value, and its wild life includes many remarkable birds and strange creatures of all kinds. These and the activities of British and Maoris alike have provided splendid subjects for stamp representation. British Post Offices were established in the country soon after 1840, that is about the same time as the production of the "Penny Black," but no adhesive postage stamps were issued there until 1855.

The earliest stamps of the country are beyond the reach of the average "*M.M.*" reader, so we need not spend much time over them. The first was a portrait stamp of Queen Victoria. The portrait is an interesting one, of full face, and stamps of the same design, printed first in Great Britain and later in Auckland, continued in use for nearly 20 years. They were followed by other portrait designs, not so attractive in character, and not so highly priced to-day.

The first of the fine pictorial sets for which New Zealand is now famous came in 1898. This was a mixed set, illustrating well-known scenes in the islands and characteristic birds, with one value showing a Maori war canoe. Among the subjects of these stamps were Mount Cook, a snow-capped peak 12,349 ft. high in the Southern Alps, and the Pink Terrace in the volcanic hot spring district in the centre of the North Island, with Milford Sound, a great fiord, and Otira Gorge, both in the South Island. This was the first appearance on stamps of New Zealand views of a type that have provided designs for subsequent pictorial issues. The birds illustrated were the kiwi, which is without wings or tail feathers, the kea or hawk-billed parrot, and the sacred huia birds. These were the first of many stamps illustrating the unique wild life of New Zealand. One stamp of this kind of special interest showed the tuatara lizard, a creature that has been described as a living fossil; it is the only remaining representative of its kind, which was more abundant and widespread in prehistoric days.

The history of New Zealand also has been well celebrated by stamp issues. The best example of this is the centennial issue of 1940, celebrating the completion of 100 years of British sovereignty. This was a splendidly produced set of 13 values, ranging from ½d. to 1/–. One value shows the arrival of the Maoris in New Zealand; another depicts Tasman, the first European to visit it, with his ship and a copy of his chart of his discoveries; and a third, marking the re-discovery of the country by Captain Cook in 1769, carries a portrait of that great navigator and a chart of the islands that he made. The signing of the first treaty between the Maoris and the British, the landing of the first immigrants on Petone Beach in 1840, and the hoisting of the British flag on H.M.S. "*Britomart*" at Akaroa to establish sovereignty over the South Island are other notable subjects.

Further stamps in this set illustrate the Maori Council, gold mining methods of the earliest and latest days, and the kauri pine.

PEACE STAMP FREE

To commemorate the Peace the **NEW ZEALAND** Government have issued this very attractive stamp depicting **The Royal Family.** It is printed in Royal Purple colour and besides showing the family group of our King and Queen and both the Royal Princesses, is in addition inscribed: **"In peace, long may they reign."**
We have managed to obtain a supply of these stamps and therefore have pleasure in offering **YOU** one **ABSOLUTELY FREE** for your collection. To get it you must write and ask us for Royal Family Stamp Free and an Approval Selection and just send us 3d. in stamps for our posting expenses. It is a stamp you will love to receive and will be envied by your friends.

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GIBRALTAR K.G.VI 6d. to all approval applicants. A prompt and efficient approval service has been inaugurated and selections will be sent monthly, fortnightly or occasionally as required.
Collectors interested in modern British Colonials or U.S.A. are invited to apply for full particulars.
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2d. ea. 29, 54, 56, 61, 63, 77, 124, 128, 158, 167, 176, 177, 187, 199, 200, 206, 207, 208, 209, 210, 211, 211A, 212A, D2, D4, D6, *D15 Mint.
3d. ea. 31, 55, 91 coil, 93, 94, 95, 105, 109, 119, 113, 142, 143 coil, 150, 196, 213, 215, 217, *D16.
4d. ea. 66, 74, 84, 96, 123, 134, 140 coil, 147, 166, 175, 184, 188, 189, R1, *D17 Mint.
6d. ea. 92 coil, 120, 121, 145, 153, 198, 201, 202, 205, 211 coil, 212A coil, 220A, R2.
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USED CORONATIONS. Bahamas, Bechuanaland, or St. Vincent 1/3 per set each; Gold Coast, 1/1; Mint Bermuda 1/-; Br. Guiana 11d. S.A.E. please.—B. Purcell, 22, Green Lane, Amersham, Bucks.

For other Stamp Advertisements see also pages 298 and vii.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

NO one can doubt that the forthcoming Crown Colony "Victory" stamps will give a great fillip to the collecting of other King George VI stamps. This is not just a guess, for we know what happened when the "Jubilee" and "Coronation" series were issued. Then there was not only a boom in these particular sets of stamps, but contemporary emissions flourished likewise. So it behoves collectors to fill up the gaps in their Commonwealth stamps just as fast as their pockets will allow; many stamps going for coppers to-day will bring shillings before the present year ends.

As a matter of fact these "Victory" stamps are going to change our collections very much indeed, for they presage postal changes which will not only result in the emission of new values, such as a 3½d. stamp, but in the dropping of others already issued, such as the 2½d. Regarding this latter stamp, it looks almost as though it is going out of issue in most colonies, and it is significant that with the sole exception of Fiji, none of the colonies is using this value for a "Victory" stamp. We already know that it is to be dropped by Barbados when the new 3d. blue value comes out, when the "Victory" stamps are withdrawn, and other colonies will undoubtedly follow suit.

Incidentally, isn't it time that we dropped using the word "Colonial" in connection with our collections of Commonwealth stamps? It can only be correctly applied to a very small portion of them, for countries like Canada, Australia, South Africa, New Zealand, India, etc. are not colonies but Dominions. The correct designation for our collections of British Empire stamps is Commonwealth, and the sooner we get right in this the better.

The Burma "Victory" stamps are very little improvement on those produced by India, and what those artistic people must think about such "artistic" monstrosities can easily be imagined. We will illustrate one next month, if we have room.

France continues to produce beautiful stamps every month or so, and two recent issues are illustrated here. The programme for the rest of the year of the Belgium Post Office just shows how absurd was the remark of our Postmaster General when he stated that we were to have one "Victory" stamp and perhaps two if time allowed; between now and December Belgium will bring out half a dozen new issues, and all will be finely designed and technically impeccable if they run true to form. British stamp designers and printers are certainly as capable as those of any country.

We are illustrating the latest effort of the United States, a rather moderate stamp issued as a final philatelic gesture to the forces that fought the war so finely for America and the World. The cause deserved a better stamp.

Holland, like the rest of Europe, continues to produce "charity" stamps, though more sparingly than others, and we are illustrating one of a set of five "Prisoner of War" stamps, printed in somewhat sombre colours. Holland is one of the most popular countries, philatelically speaking, and as a lot of its stamps can be obtained cheaply and easily, readers not wanting to spend too much on their hobby could do worse than collect modern Holland. Its colonial stamps also are popular, but they are rather costly, and if a fairish amount of money is being spent on stamps, those of our own Commonwealth are more likely to prove profitable.

The late President Roosevelt was very fond of our stamps, but he thought that they cost too much for the average pocket; probably the older issues do, but stamps of the present reign can be collected by those who have only a few shillings to spare at a time, or even half a crown a week, for short mint sets can be bought for as low as a shilling each and as time goes on the higher values can be purchased. The writer knows a collector who has a really magnificent collection of Commonwealth issues. He started this years ago by just buying sets to 3d., and as time went on, and his spare cash increased, he amplified his sets until to-day his collection could be sold for several hundreds of pounds.

A collection of foreign stamps of course can give a lot of fun, and many can be picked up for very little, but just as they can be obtained easily they are never likely to become very valuable. Everybody to his taste, however. Collect just what you like; but if you are going to spend all your pocket money, and you like our Commonwealth stamps—well, you couldn't do better, particularly with the issues of to-day. So many are still obtainable at a small percentage over their face value, and on the whole there are none more beautiful.

Speaking of beautiful stamps, it seems to be the prevailing opinion that the present "Victory" set of New Zealand, two of which were illustrated last month, is one of the most beautiful ever issued. Judging by the way they are selling, this fine issue will surely break all records. It is said that one or two of the values may not last out the year.

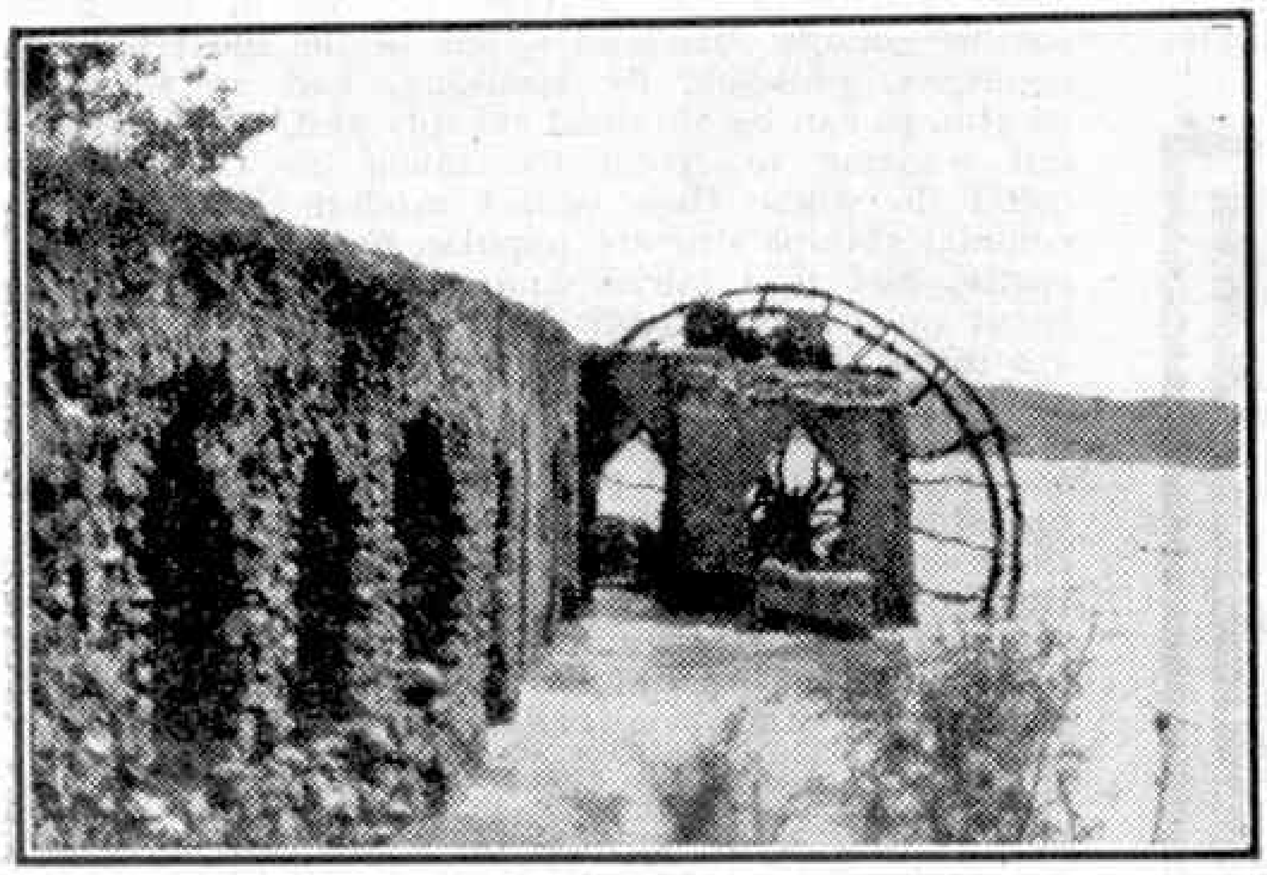
And now for our monthly tip. Some time ago, the Crown Agents placed on sale in London a new printing of the 2½d. stamp of Barbados. The shade differed from the previous printing, and Gibbons listed the new stamp as blue instead of bright ultramarine, which was the designation of the displaced stamp. Well, this blue stamp has never appeared in the colony, and it is already off sale at the Crown Agents. So if a copy can be obtained at a shilling or so it will prove a very good buy, providing it is not reprinted, and this is not likely. It can be identified by the gum, which is white, or clear, to be exact.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

AN ANCIENT WATERWHEEL

In various eastern countries, especially where the rainfall is scanty, there were developed many centuries ago various kinds of apparatus by which man could obtain water to irrigate the land on which he raised his crops. For instance, on the plains of Babylonia between the Rivers Euphrates and Tigris the inhabitants of thousands of years ago planned and built a really marvellous system of irrigation for flooding the land between the rivers, corn from which fed the inhabitants of the great cities of Nineveh and Babylon. Some relics of these ancient works can still be seen, with others of more recent date. The waterwheel illustrated on this page is an example. It is near the site of the ancient city of Babylon, on the Lower Euphrates, and is in a remarkable state of preservation that itself is a fine tribute to the craftsmen who, with the crudest of tools, fashioned it many years ago.



An old waterwheel on the Euphrates, near the site of the ancient city of Babylon. Photograph by C. E. Christian, Worksop.

The wheel was not in use when the picture was taken, for to-day the old systems have been replaced by modern methods of irrigation. The land between the great rivers, which through the centuries after the decay of civilisation in this part of the east had been allowed to become overgrown, is now rich and fertile, and over a million acres of this sub-tropical plain are producing good crops again.

C. E. Christian (Worksop).

A TRIP ON "THE FAIRBOURNE EXPRESS"

Fairbourne is about four miles from Barmouth, in Merionethshire. When we were staying in Barmouth, we set off one afternoon for Fairbourne. We walked to the harbour and then were rowed across the estuary by one of the local fishermen. After a short wait among the sand dunes a column of smoke was seen approaching, and a few seconds later "*The Fairbourne Express*" chugged to a standstill.

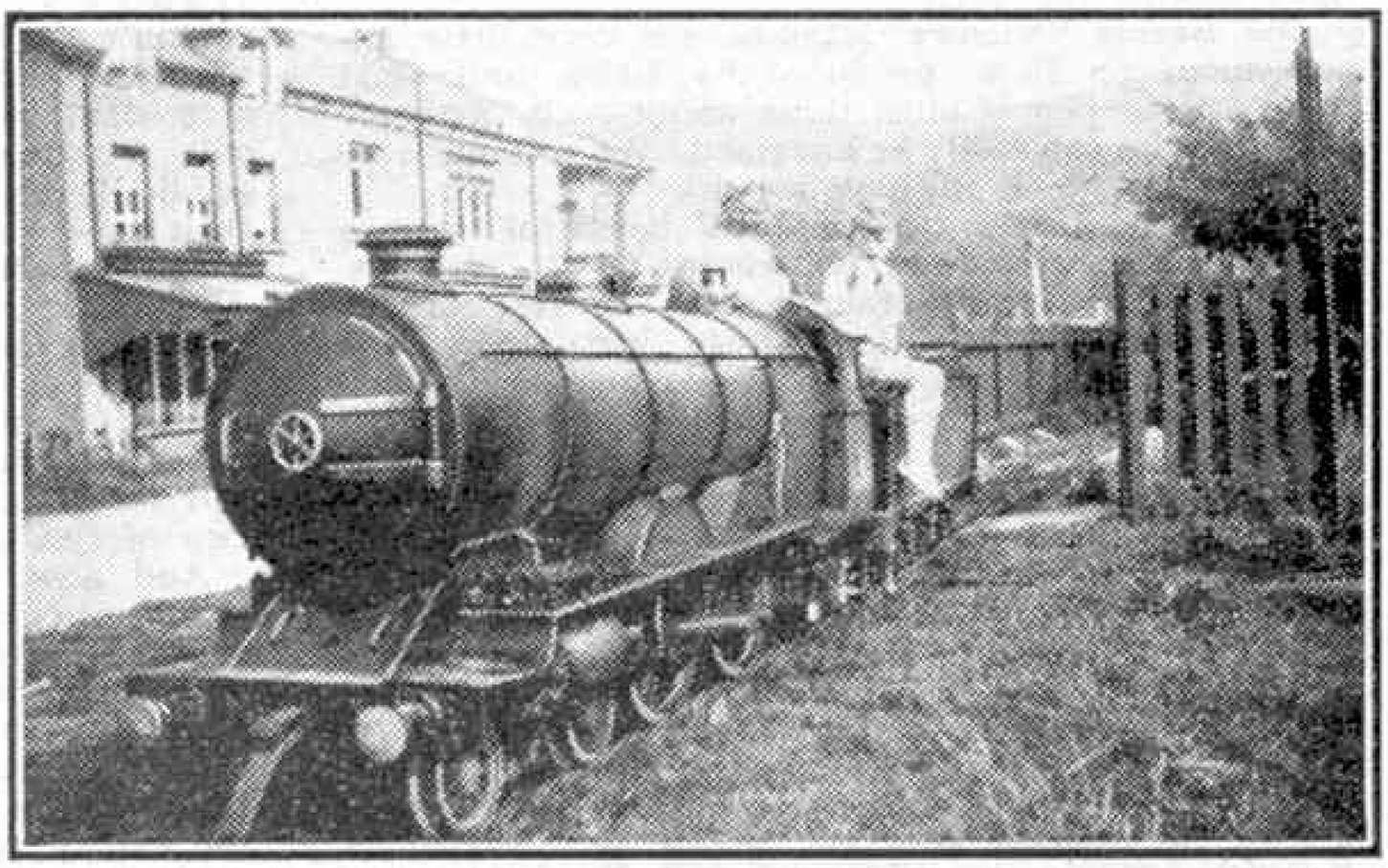
This train is a miniature one that runs on the Fairbourne Railway, a line of 15 in. gauge about three miles long between Barmouth Ferry and Fairbourne railway station. The engine is green in colour and is coal fired. The carriages, of which there were about eight on our trip, are just trucks with seats in, and the driver, whose position is on the front of the tender, had to sit in a crouched attitude.

A few minutes after we boarded the train the conductor, who rode on the back of the train, came to collect our fares. Then there was a "peep" from the whistle and with a jerk the train started. It wound its way among the dunes, and soon we were on a fairly straight part of the run, where there is a small bridge. The last carriage had just crossed when with a jerking and grinding the whole train came to a standstill. The driver and conductor got out, and inspection showed them that the springs of one coach had broken and the wheels were rubbing on the floor of the coach.

Everybody got out of the train and all the male passengers set to work. They got the coach off the lines and turned it upside down. A piece of rusty fencing wire was then brought from a nearby fence, and this was used to tie the spring together. Off started the train again, but the conductor stayed behind to mend the track, which was faulty at that point, and when we passed by on our return journey he was still busy.

Before the war the rolling stock of the Fairbourne Miniature Railway consisted of two locomotives, one petrol and one steam, and five passenger carriages. The steam locomotive was an "Atlantic" weighing 2½ tons in working order, and the petrol unit was a Lister Auto-rail Truck with a 9 h.p. engine. A staff of three ran the line.

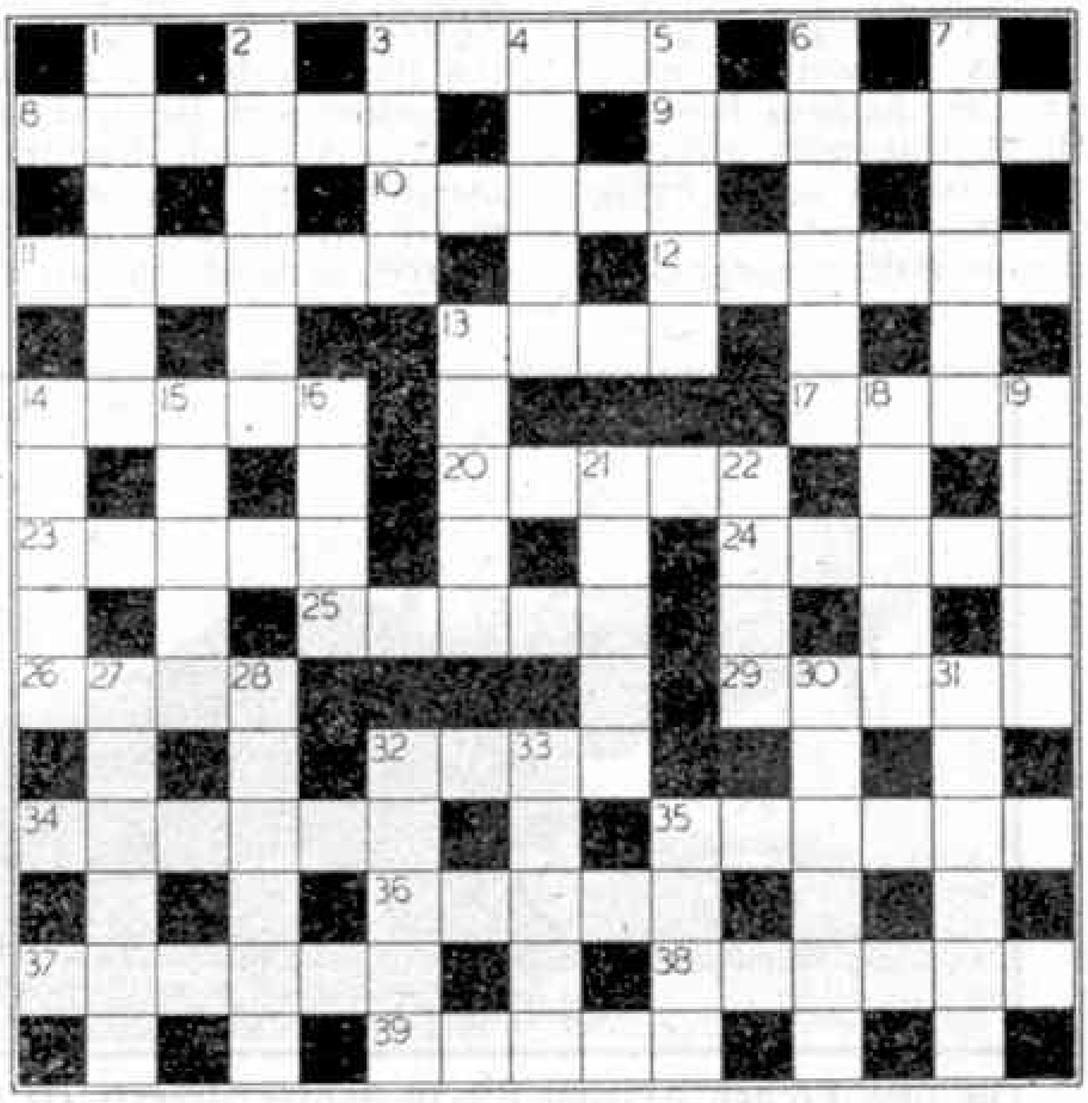
D. K. Powell (Wolverhampton).



The engine of the "Fairbourne Express" at the Fairbourne terminus of the Welsh 15 in. gauge line near Barmouth. Photograph by D. K. Powell, Wolverhampton.

Competitions! Open To All Readers

An Easy Crossword Puzzle



CLUES ACROSS

3. Outline
8. Useless
9. Existing
10. Relinquish
11. Boisterous
12. Beasts of prey
13. Engage
14. Ferment
17. Small boat
20. Recess
23. Praise
24. Indian Emperor
25. Release
26. Gloomy
29. Concise
32. Dread
34. Shelf over fire
35. Loft
36. Pigment
37. Amuse
38. Overwhelm
39. African Country

CLUES DOWN

1. Gloss
2. Cloud
3. Moist
4. Imbecile
5. Parts of body
6. Theatrical
7. Patron Saint
13. Indian Fruit
14. Give up
15. Change
16. Sound or tax
18. Rage
19. French Town
21. Applaud
22. Send forth
27. Thorny tree
28. Young feline
30. Exasperate
31. Expands
32. Musical Instrument
33. Monastery
35. Pluck

Again we give our readers one of our straightforward crossword puzzles. It is contributed by a reader, T. K. Chaplin, and every word in it can be found in standard dictionaries. The competition is divided into sections for Home and Overseas readers, in each of which prizes of 21/–, 15/– and 10/6 will be given for the best solutions. If necessary the judges will take neatness and novelty into consideration when making their awards. Consolation prizes will be given for other meritorious efforts.

Entries should be addressed *"July Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 31st August; Overseas Section, 28th February, 1947.

JULY COMPETITION

Hidden Engines

Here is another opportunity for the name and number enthusiasts to identify some of their favourites from a list of clues. Each of the clues below represents the name of a locomotive of one or other of the British railways, and all the names chosen appear in the standard publications on the subject. Competitors are required to make a corresponding list giving the names of the engines that they think are represented; the class of each engine should be stated, with its wheel arrangement and its owning company. After adding his name and address, the competitor should then forward his entry to *"July Hidden Engines Contest, Meccano Magazine, Binns Road, Liverpool 13."*

Here are the clues: **1, Often eaten at picnics; 2, Sound suggests opening locked doors; 3, Defeated by Drake; 4, A constellation; 5, A fast train; 6, Tropical wind; 7, One-time famous liner; 8, "Old Father . . . . . "; 9, Famous G.W.R. engineer; 10, Well-known fish; 11, A girl's name; 12, Many fine engines built there; 13, Once roamed the seas; 14, A sweetmeat; 15, Overlooking the sea; 16, A number of trees; 17, Famous Cathedral, or School; 18, A Transcontinental Railway.**

There are two sections in this contest, Home and Overseas respectively, and in each there will be three prizes, of values 21/–, 15/– and 10/6. Other deserving efforts will be awarded Consolation Prizes, and in the event of a tie for any prize the judges will take neatness and novelty into consideration.

Closing dates: Home Section, 31st August; Overseas Section, 28th February, 1947.

July Photographic Contest

This month's contest is the 7th of our 1946 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions: 1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections: A, for readers aged 16 and over, and B for those under 16. They should be addressed *"July Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 31st July; Overseas Section, 31st January, 1947.

Prize-winning entries become the property of Meccano Ltd. Unsuccessful efforts will be returned if they are accompanied by a stamped addressed envelope or wrapper.

The Fairey "Spearfish"—*(Continued from page 269)*

heavy landing—that of the "Spearfish" has been made especially strong to guard against this. In fact the whole aircraft structure has an over-the-target safety factor of 10, which means that it can stand 10 times the breaking forces exerted on it during normal flight.

As the "Spearfish" has an endurance of over five hours at just under 200 m.p.h. it has great possibilities for police or patrol work as well as more aggressive duties. If necessary, the spacious fuselage enables it to be used as a light transport aircraft. In fact the "Spearfish" can perform all naval flying duties with the exception of pure combat.

During the war eight out of nine British aeroplanes delivered to the Royal Navy were of Fairey design. The "Spearfish" will carry on the fine traditions established by these aircraft and help to ensure that the Royal Navy will continue to rule the skies over the seas.

The Victoria Falls Bridge—

(Continued from page 271)

erection could be removed.

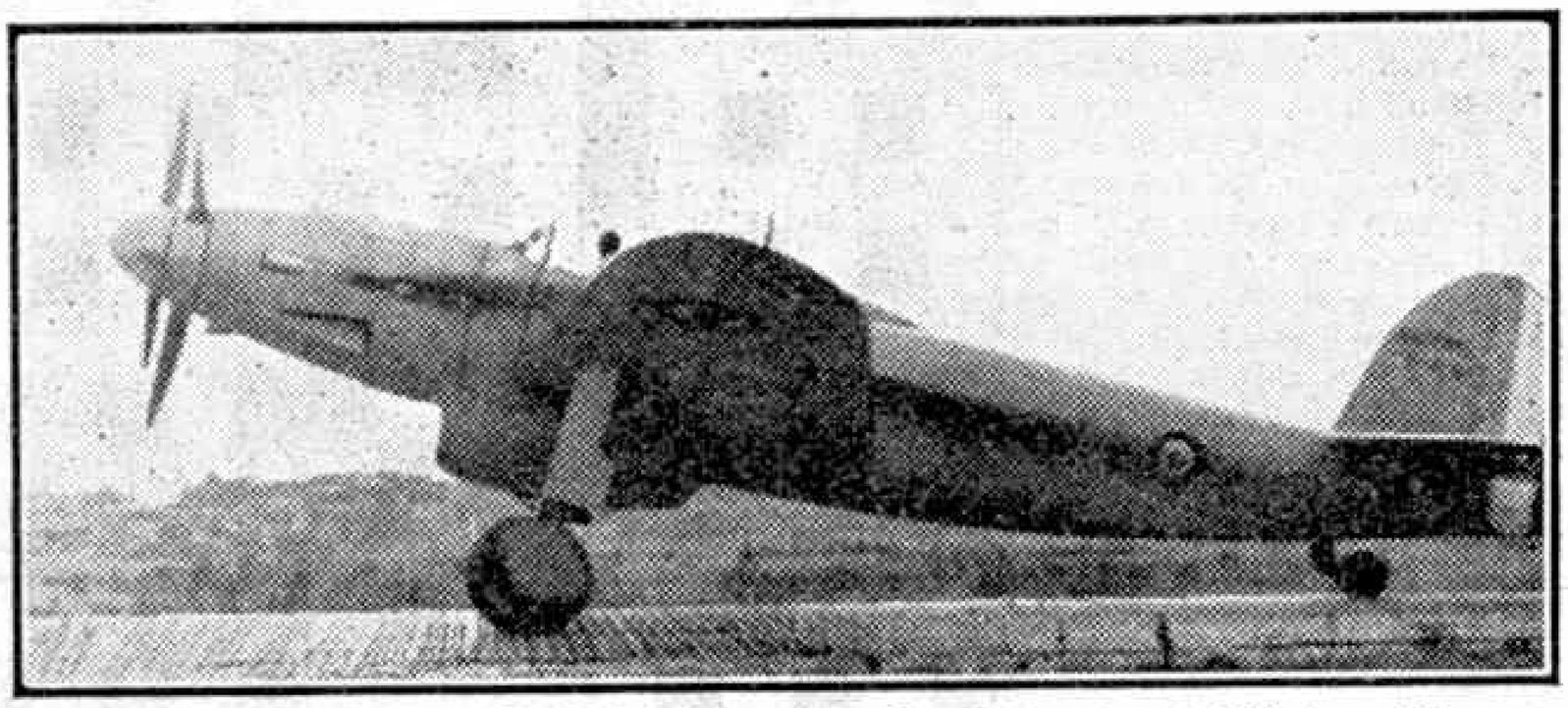
On the completion of the steelwork the double railway track was laid on timbers resting in steel troughs fixed to the cross girders of the deck of the bridge. The rest of the deck was constructed of creosoted pine planks 3 in. thick, and later these were given a coating of cement.

Almost 30 years afterwards the growth of road traffic, due partly to the attraction of the Victoria Falls for tourists, led to the reconstruction of the bridge to make it suitable for traffic of all kinds. The first step was to raise the permanent way to a height of 4 ft. 7 in. above its original level, after which the old deck was dismantled in sections. The construction work required for increasing the width of the deck from 33 ft. to 43 ft. was then carried out, this involving also the steps necessary to give the bridge a sufficient margin of strength to carry the extra weight. Before this was done motor cars and other vehicles could only be taken across the Zambesi by loading them on railway wagons.

The Railways of Switzerland—*(Cont. from page 284)*

near the Lake of Lucerne affording superb views. The greatest altitude attained by rail transport in Europe is claimed for the Jungfrau electric rack and pinion railway, which by partly tunnelling through the mountain as it climbs reaches a terminus 11,340 ft. up. It was hoped to reach the 13,500 ft. high summit, but that has not so far been attempted by train. The Jungfrau is one of the magnificent giants of the Bernese Oberland range.

There are numerous "funiculars" to carry one up in single cars on rails to view points, hotels, ski grounds, lesser mountain summits and the like. These are cable-hauled concerns, like the cliff lifts seen at British resorts, though sometimes of considerable length and steepness. The cars are linked to a cable, of the stout wire rope pattern, wound round a drum in the summit power house. Two start simultaneously, one from the top and one from the bottom, and they pass half way. One of the finest examples is the Parsenn cable railway at Davos, which is in two separate sections on account of its great length. The first section has gradients of almost 1 in 2 and is 2,017 yds. long; the second has a length of 2,405 yds. Thus the total climb is one of over 2½ miles, but the journey can be accomplished in 22 min. There are long stretches of concrete viaduct up the mountainside on which the tracks are laid, and there is an up-to-date system of electric control based on the half-way station, where passengers change and cars terminate. The start is at an altitude of 5,115 ft. above sea level, and the height of the terminus is 8,732 ft., or almost twice the height of Ben Nevis. Some of the finest ski-runs in Switzerland begin up there on the Weissfluh. From the terrace there is a glorious view, especially of the Engadine and Bernina mountains 30 and more miles away. At such heights the weather in winter is usually calm, clear and strongly sunny, enabling one to sit out of doors in comfort notwithstanding many degrees of frost; the air is dry and absolutely pure.



The new French Arsenal VB-10 fighter aircraft. It has two 1,200 h.p. Hispano-Suiza engines in tandem, driving contra-rotating propellers.

Reliable and powerful braking systems ensure an almost unbroken record of safety on all Swiss mountain railways.

THE LOCOMOTIVE STOCK BOOK

The Railway Correspondence and Travel Society announce publication early in July of the first post-war edition of the well-known "Locomotive Stock Book." It will consist of about 100 pages, with 80 illustrations, and in addition to giving the total locomotive stock of the railways (including Light Railways) of Great Britain and Ireland, as at 31st December, 1945, it will include stock alterations 1939–1945 (main line railways), and a list of all named locomotives. The L.M.S. and L.N.E.R. renumberings are also given, together with particulars of inter-company and W.D. loans. Though primarily produced for the benefit of members of the Society, it is hoped to make a certain number of copies available for sale to non-members. Further particulars will appear in these pages in due course.

COMPETITION RESULTS

HOME

November 1945 "Bridge" Contest.—1st Prize: D. J. D. Gilbert, Bromley, Kent; 2nd Prize: R. H. Higgins, Castle Bromwich; 3rd Prize: E. Phasey, Stretford, Lancs. Consolation Prizes: D. M. Thomas, Birmingham; R. Bottomley, Deal.

November 1945 "Photographic" Contest.—1st Prizes, Section A: J. W. Terry, Ewell; Section B: E. R. R. Walker, Edinburgh. 2nd Prizes, Section A: L. A. C. Atkins (R.A.F.), Eccles; Section B: E. Beaumont, London N.W.8. Consolation Prize: L. Fieldsend, Sheffield 5.

OVERSEAS

May 1945 "Colour Drawing" Contest.—1st Prizes, Section A: I. Boocock, Canterbury, N.Z.; Section B: M. Power, Mowbray, S.A. 2nd Prizes, Section A: I. Benjamin, Transvaal, S.A.; Section B: A. Walters, Canterbury, N.Z. 3rd Prizes, Section A: L. M. Robinson, Alberta, Canada; Section B: B. I. Ingram, Bombay, India. Consolation Prize: R. Humphreys, Karachi.

Fireside Fun

Teacher: "Now Willie, can you tell me the nationality of Napoleon Bonaparte?"
Willie: "Course I can, Miss."
Teacher: "Very good, Willie. That is quite correct."

* * * *

"Listen, next time I order a chicken don't send me an aeroplane fowl."
"What is that, madam?"
"You know well enough. All wings and machinery."

* * * *

"Look at me. Six feet two in my socks."
"Maybe, but I'm six feet four with my hat on."
"And I can beat the lot of you. Seven feet eight with my umbrella up."

* * * *

"You remember when you cured my rheumatism last year, doctor, and told me not to get myself wet?"
"Yes, Jones. What about it?"
"Well, sir, nothing much. I was just wondering if I would be safe having a bath yet."

* * * *

"Billy isn't getting on well at school."
"Well, it takes the poor child nearly an hour to get home to this outlandish place, and he forgets all he's been told before he gets half way."

* * * *

"Where does this train go to, porter?" asked a passenger at King's Cross.
"Edinburgh, sir, in 10 minutes."
"Really. Now that is what I call an express."

* * * *

McTavish: "Can you let me have an empty bottle?"
Chemist: "Yes, for 3d., but it will cost you nothing if you have something in it."
McTavish: "Guid. Pit a cork in it."

* * * *

"What is it that gets wetter with drying?"
"Nothing can do that, silly."
"A towel does."

* * * *

THIS MONTH'S HOWLER

A mandoline is a high Chinese official.

BRAIN TEASERS

FIND THE KEYWORD!

We begin this month with an unusual division sum, in which letters represent figures. There are five letters altogether, each representing one of the figures from one to six, and with the addition of a sixth letter they provide a keyword in which the letters represent all six of these numbers in order. Can you find the figures?

```
TOUA)ORTTR(AR
 TOUA
 ----
 UAAUR
 UAAUR
 -----
 . . . . .
 -----
```

The heading of this section is a useful hint to the best approach to the solution of this problem. B.I.N.

* * * *

STEP BY STEP

For our second teaser we give a step word puzzle. In this there are 10 words and the last two letters of each are the first two of the next. The clues are as follows: 1, Place of public contest; 2, Lowest point of anything; 3, Angry; 4, Irritate; 5, Coarse swamp grass; 6, Kind, 7, Forerun; 8, Heath; 9, Level stretch of river bank; 10, Part.

* * * *

YOU MUST KNOW THESE

Can you recognise the B.B.C. programme features that have been disguised in the following jumbles, in each of which the letters of the feature represented have been rearranged: BURST TRAINS; IWU STILL JAM; SHALL I CUM; CAVE CUC AID SLAM; and FOREST VIA ILYMFAU.

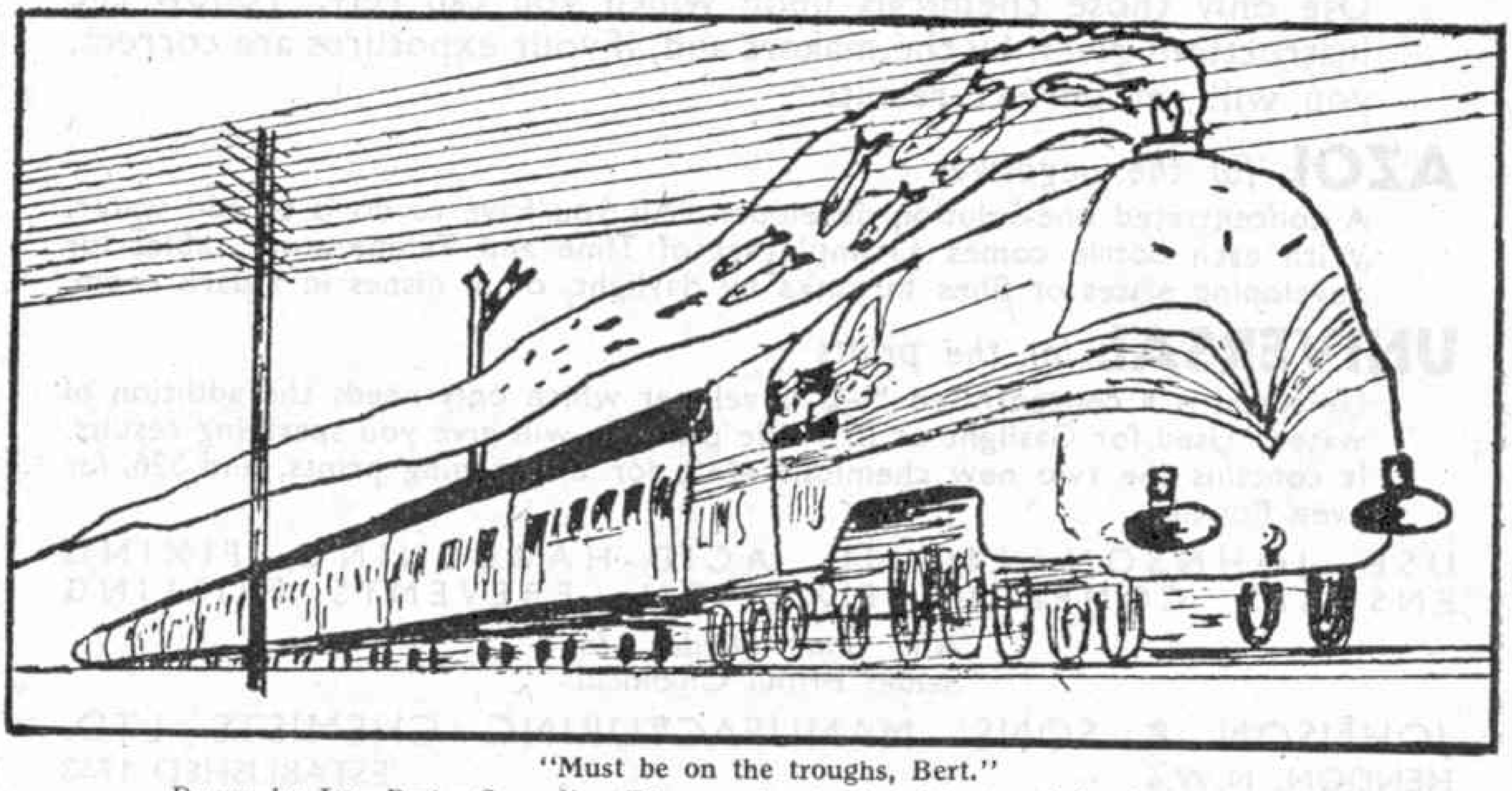
* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

Smith's telephone number in our first teaser in the June "*M.M.*" is 668. The statement that the three figures in this multiplied together give the number of square inches in a certain number of square feet means simply that the product of the three is 144 or a multiple of it, in this case 288.

The four boys and one girl of our second problem would weigh altogether 43½ stones.

The six countries disguised in our third teaser are: Colombia; Sumatra Nigeria; Argentine; Denmark; and Siberia.



"Must be on the troughs, Bert."

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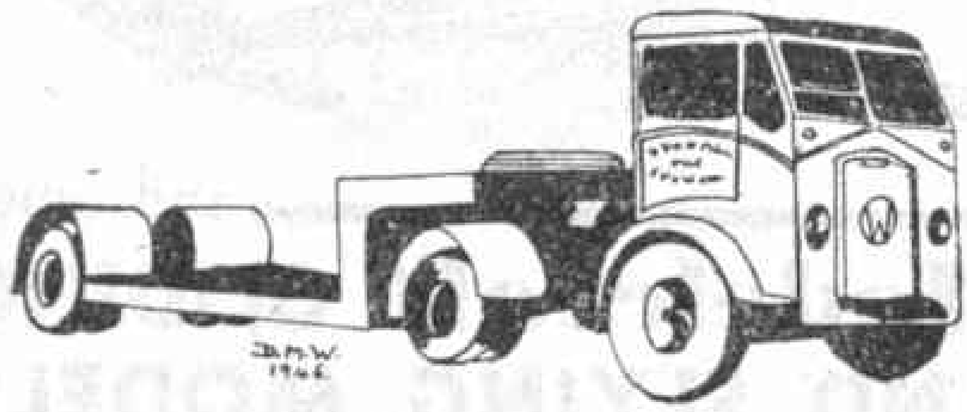

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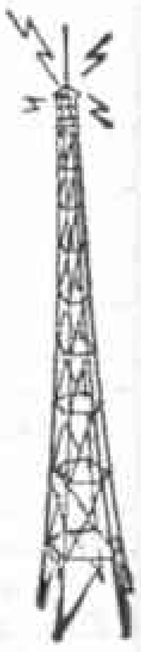

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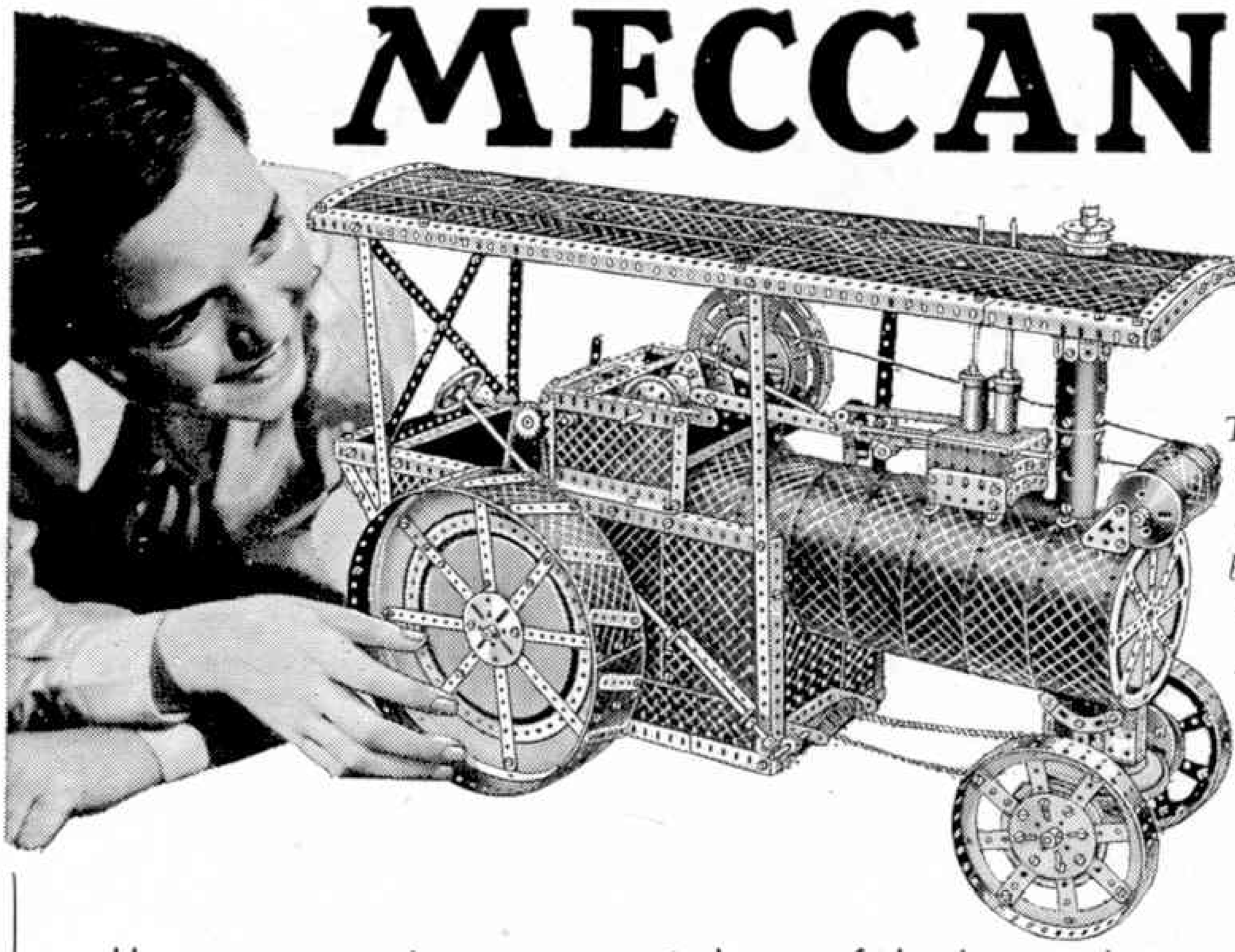

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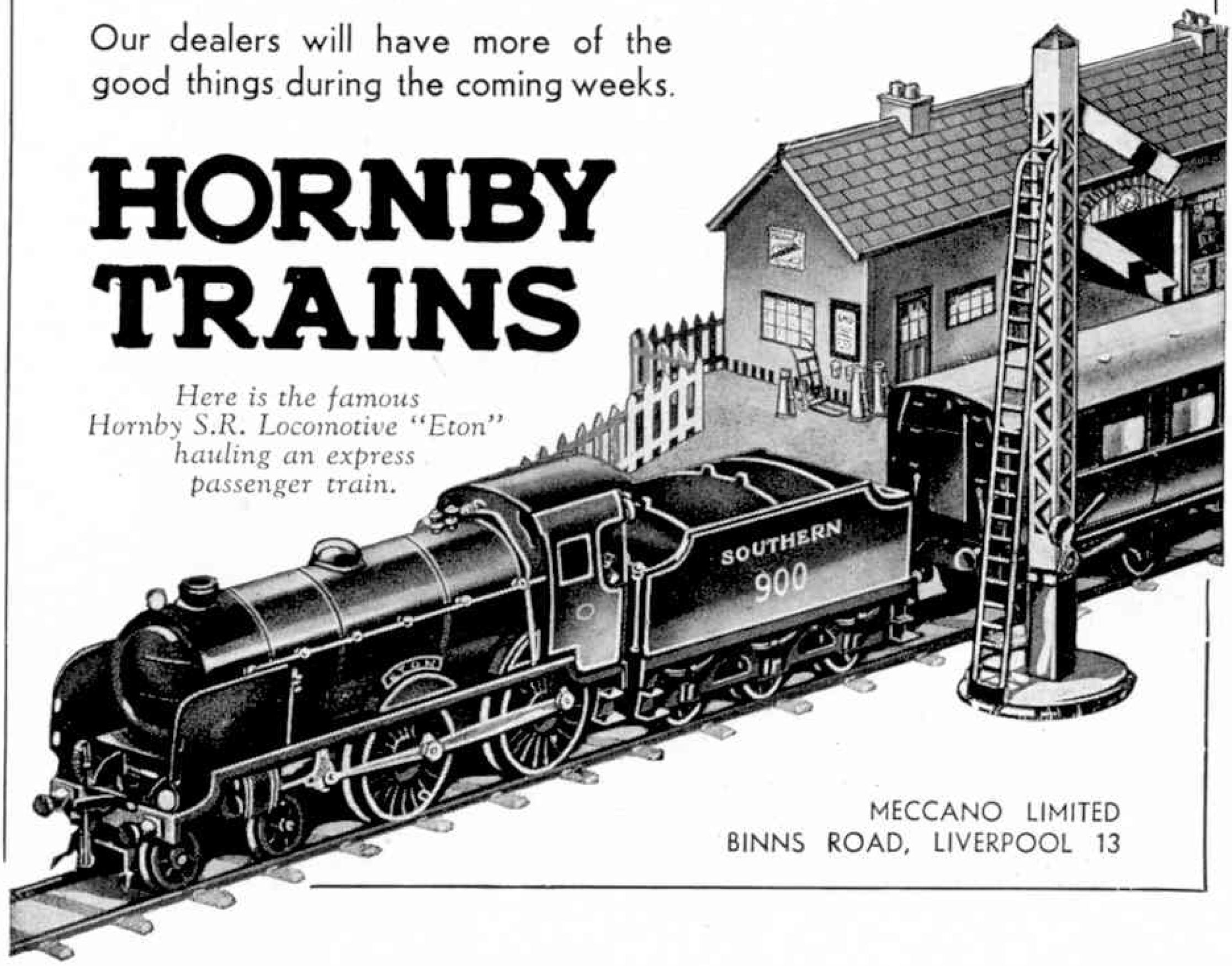

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